RICOH Technical Bulletin No. F/L Series - 041

SUBJECT: New Model LSOMkII	**DATE:** 1996. 8. 18
PREPARED BY: K. Misugi / M.Mano CHECKED BY: S. Fujii	FROM : 2nd Field Information Group, QA Division

CLASSIFICATION:

- ☐ Action Required
- ☐ Troubleshooting
- ☐ Retrofit Information
- ☐ Revision of service manual
- ■ Information only
- ☐ Other

MODEL:
RICOH MV310E
Savin 9910DPe
Ges 3210X

The new model LSOMkII (RICOH MV310E) has been released in the line-up of the LSO (RICOH MV310) series.

This technical bulletin contains information on differences between the LSOMkII and the LSO. They are listed in order of sections that appear in the service manual.

1. OVERALL MACHINE INFORMATION

1.1. SPECIFICATIONS

	LSO	LSOMkII
SAF Standard Size	576 kbytes (45pages/Slerese letter)	640 kbytes (52pages/Slerese letter)
SAF with an optional memory card	Optinal memory card not available	+1 Mbytes (135 pages/Slerexe letter) / +2 Mbytes (218 pages/Slerexe letter) / +4 Mbytes (384 pages/Slerexe letter)
Modulation	V.29, V27ter, V21	V.33,V.29, V.27ter, V21
Data Rate (bps)	9600/7200/4800/2400	14,400/12,000/ 9600/7200/4800/2400
Transmission Time	9 s at 9600 bps; (Measured with G3 ECM using memory for a ITU-T #1 test document at standard resolution)	6 s at 14,400 bps; (Measured with G3 ECM using memory for a ITU-T #1 test document at standard resolution)
Paper Size and Capacity: (for paper feed unit)	Optional paper feed unit not available	Paper Feed Unit (Optional): 500 sheets, available paper size USA: Letter, Legal Europe: A4, A5 sideways Asia: A4, A5 sideways, F/F4

1.2. FEATURES

Sub-Title	Item	LSO	LSOMkII
Equipment	Fax Expansion Card (1MB / 2MB / 4MB)	Not available	Available
	Optional paper feed unit	Not available	Available (500 sheets)
Features	Reverse Order Printing	Not available	Available (with 1/2/4MB memory card)
	Sort Copy	Not available	Available (with 1/2/4MB memory card)

1.4. OVERALL MACHINE CONTROL (Please refer to page 7.)

1.5. VIDEO DATA PATH (Please refer to page 8 and 9.)

1.6. POWER DISTRIBUTION DIAGRAM (Please refer to page 10.)

2. DETAILED SECTION DESCRIPTIONS

2.1. Scanner

2.1.1. Mechanisms

The scannning speed of LSOMkII: 2.7 s. (Slerexe Letter).
(The scanning speed of LSO: 5.7 s.)

2.2. PRINTING

2.2.7. Paper Feed

5. Drive Mechanism

Paper Feed Priority
If all the cassettes contain paper of the same size, the machine uses the paper in the optional paper feed unit first, the paper in the standard cassette second, and the paper in the optional 100 sheet cassette last. However, this order can be changed with printer bit switch 02 bit 0. (Please refer to section 4 of this RTB.)

2.2.8. Registration

Jam Detection
New error codes have been added for the optional paper feed unit (500 sheets).

	Condition	Error Code
When the optional paper feed unit is used	When the relay sensor in the paper feed unit is not turned on within 2.0 seconds after the paper feed clutch is turned on.	9-50
	When the registration sensor in the fax machine is not turned on within 2.0 seconds after the paper feed motor started.	9-51

2.2.13. Paper Size Selection

Same as the previous page for the Paper Feed Priority.

2.4. PCBs

2.4.1. FCE3 (Please refer to page 11.)

2.4.2. FDU2 (Please refer to page 13.)

4. SERVICE TABLES AND PROCEDURES

The settings and the switches that are different from the LSO are shaded.

Communication Parameters:

Mode	DCS: ITU-T standard NSS: Non-standard G3
Modem rate	144: 14400 bps 120: 12000 bps 96: 9600 bps 72: 7200 bps 48: 4800 bps 24: 2400 bps
Communication mode	ECM: With ECM SSC: Using SSC EFC: Using EFC NML: With no ECM, SSC, or EFC
Compression mode	MMR: MMR compression MR: MR compression MH: MH compression
Resolution	SSF: Fine, transmitted at 8 x 15.4 dots per mm DTL: Detail, transmitted at 8 x 7.7 dots per mm STD: Standard, transmitted at 8 x 3.85 dots per mm
I/O rate	0M: 0 ms/line 10M: 10 ms/line 2/M: 2.5 ms/line 20M: 20 ms/line 5M: 5 ms/line 40M: 40 ms/line
Width and reduction	=A4: A4 (8.3"), no reduction =B4: B4 (10.1") no reduction >A4: Reduced to A4 (8.3") before transmission

Printer Switch 02		
	FUNCTION	**COMMENTS**
0	Paper Feed Priority **0:** Optional paper feed unit > 100 sheet cassette > Standard cassette **1:** Optional paper feed unit > Standard cassette > 100 sheet cassette	This bit determines which set of priorities the machine uses for feeding the paper when all the cassettes contain the same paper size.
1 to 7	Not used	Do not change the settings.

RICOH **Technical Bulletin No. F/L Series - 041**

SUBJECT: New Model LSOMkII

DATE: 1996. 8. 18

G3 Switch 05		
	FUNCTION	**COMMENTS**
0 to 3	Initial Tx modem rate **Bit 3 2 1 0 Setting (bps)** 0 0 0 1 2.4k 0 0 1 0 4.8k 0 0 1 1 7.2k 0 1 0 0 9.6k 0 1 0 1 12.0k 0 1 1 0 14.4k Other settings - Not used	These bits set the initial starting modem rate for transmission.
4 to 7	Not used	Do not change the settings.

G3 Switch 06		
	FUNCTION	**COMMENTS**
0 to 3	Initial Rx modem rate **Bit 3 2 1 0 Setting (bps)** 0 0 0 1 2.4 k 0 0 1 0 4.8 k 0 0 1 1 7.2 k 0 1 0 0 9.6 k 0 1 0 1 12.0k 0 1 1 0 14.4k Other settings - Not used	The setting of these bits is used to inform the transmitting terminal of the available modem rate for the machine in receive mode. Use a lower setting if high speeds pose problems during reception.
4 to 7	Modem types available for reception **Bit 7 6 5 4 Setting** 0 0 0 1 V27ter 0 0 1 0 V27ter and V29 0 0 1 1 V27ter, V29, V33 0 1 0 0 V27ter, V29, V33 Other settings - Not used	The setting of these bits is used to inform the transmitting terminal of the available modem type for the machine in receive mode.

RICOH **Technical Bulletin No. F/L Series - 041**

SUBJECT: New Model LSOMkII | **DATE:** 1996. 8. 18

5. REPLACEMENT AND ADJUSTMENT

5.11. IMAGE ADJUSTMENT

5.11.3. Printer Parameters

New parameters have been added for the adjustment of the paper feed unit.

1. Margin (Main Scan Direction)

Parameter	RAM Address	Unit	Initial Setting
W1	Optional Paper Feed Unit 800358(H)	0.5mm	07(H) Min:0(H) / Max:64(H)

2. Margin (Sub Scan Direction)

Parameter	RAM Address	Unit	Initial Setting
L1	Optional Paper Feed Unit 80034E(H)	0.5mm	06(H) Min:0(H) / Max:30(H)

6. TROUBLE SHOOTING

6.4. ERROR CODES

New error codes have been added for the book scanner.

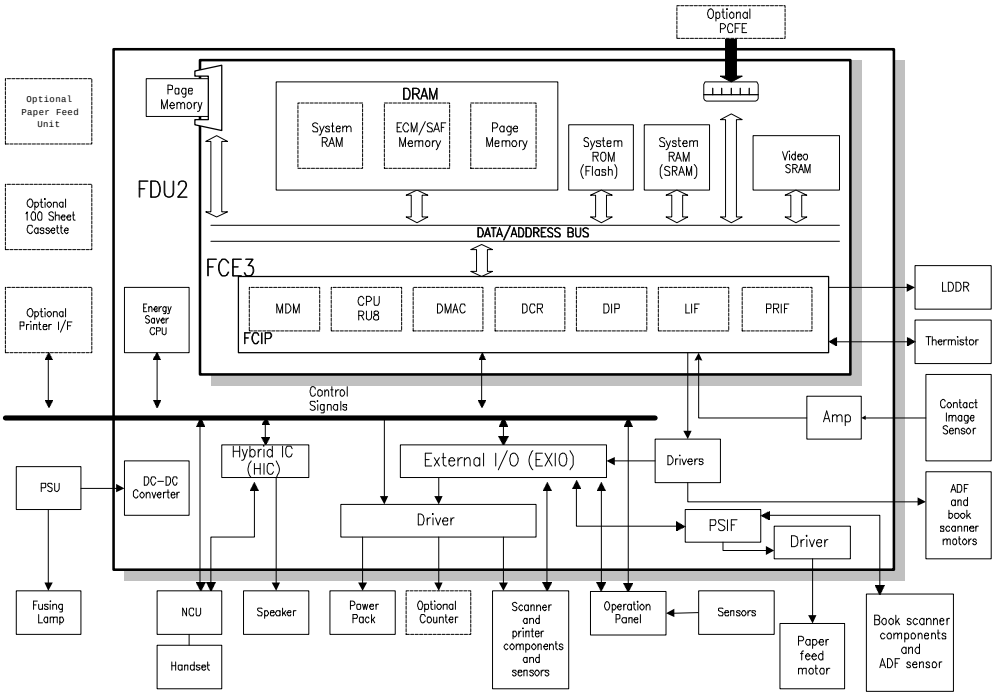
Code	Meaning	Suggested Cause / Action
9-90	Scanner home position: H.P. sensor does not go On, when the scanner returns to the home position.	Check the H.P. sensor (and its connection) Replace the FCE.
9-91	Scanner home position: H.P. sensor does not go Off, when the scanner starts scanning	Check the H.P. sensor (and its connection) Replace the FCE.

Technical Bulletin No. F/L Series - 041

SUBJECT: New Model LSOMkII

DATE: 1996. 8. 18

1.4.OVERALL MACHINE CONTROL



H522V501.wmf

The FCE3 (Facsimile Control Engine) contains the FCIP (Facsimile Control and Image Processor), DRAM, SRAM, System ROM, R144EFXL modem, and video processing memory, and controls the entire system through the FDU2 (Facsimile Driver Unit).

There are two cpus in the machine: the main cpu (FCIP) on the FCE and the energy saver cpu on the FDU. In energy saver mode, the main CPU switches off and the energy saver CPU takes over.
The FCIP consists of the following component blocks:

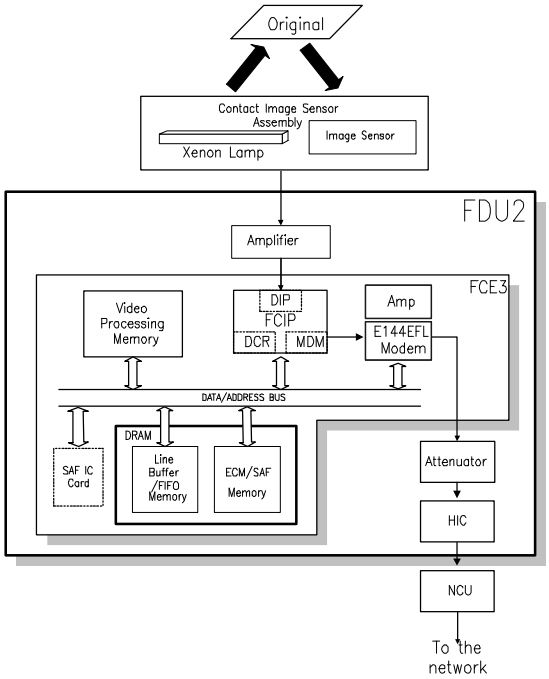
- RU8 CPU - Main CPU
- MDM - Modem (only used for V.21)
- LIF- Laser Interface
- DMAC - DMA Controller
- PRIF - Printer Interface
- DIP - Digital Image Processor
- DCR - Data Compression and Reconstruction

The modem in the FCIP is used for V.21 communications (and also as a tone generator). The Rockwell R144EFXL modem is used for V.33, V.29, and V.27ter communications.

The FCE3 contains two 2 MB DRAMs. The DRAM contains the SAF memory, ECM buffer memory, work area, and page memory. The SAF memory can be extended by 1, 2, or 4 Mbytes with an optional IC card.
Another 2MB DRAM is used only as a page memory.
A 512 kB (4 Mbit) flash ROM is used for the system ROM. Software in this ROM can be rewritten from the IC card slot or by RDS. Another 128 kB mask ROM contains LCD wording data.

1.5.VIDEO DATA PATH

1.5.1. Transmission



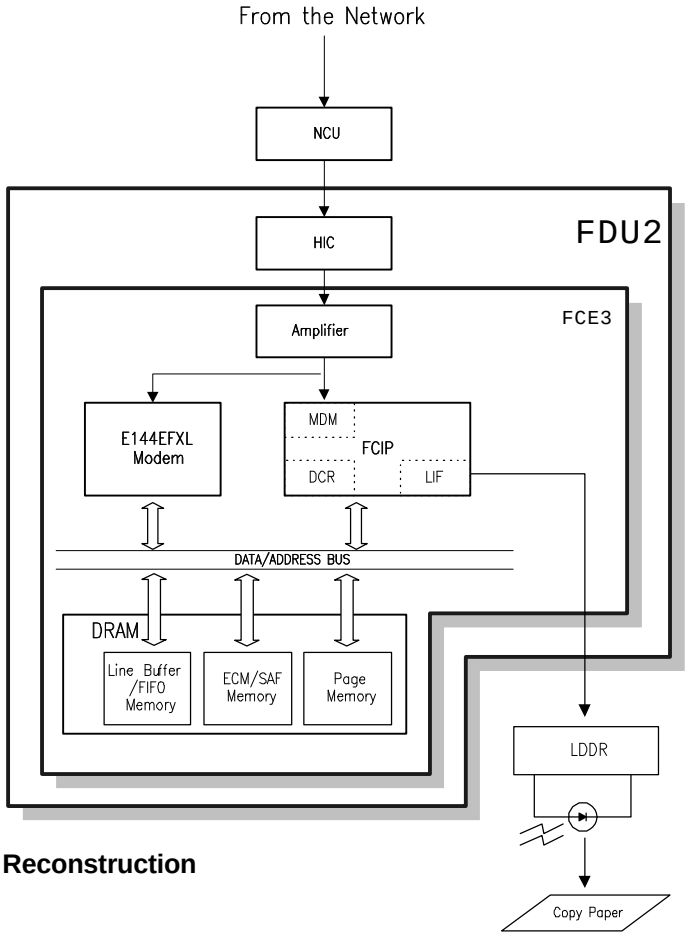
H522V502.wmf

DIP: Digital Image Processor
DCR: Data Compression & Reconstruction

Immediate Transmission:
Scanned data from the contact image sensor passes to the DIP block in the FCIP. After analog/digital video processing, the DCR block compresses the data for transmission. The compressed data then passes either to the FIFO memory or to the ECM memory before it is sent to the telephone line through the modem.

Memory Transmission:
First, the scanned data is stored in the SAF memory after compression in the DCR block.
At the time for transmission, the DCR block decompresses the data from the SAF memory, then compresses it again after handshaking with the other terminal is done. The compressed data then passes either to the FIFO memory or to the ECM memory, before it is sent to the telephone line through the modem.

1.5.2. Reception



LIF: Laser Interface
DCR: Data Compression & Reconstruction
MDM: Modem

H522V503.wmf

Data from the line passes to the modem through the NCU and hybrid IC. After the modem demodulates the data, the decompressed data passes to the DCR block, through either the FIFO or the ECM memory, where the data is decompressed to raster image data. At the same time, the compressed data passes to the SAF memory as a backup in case of mechanical problems during printing (substitute reception).

The raster image data is then passed to the page memory for printing. After a page of data has been stored in the page memory, the data is sent to the LDDR through the LIF block.

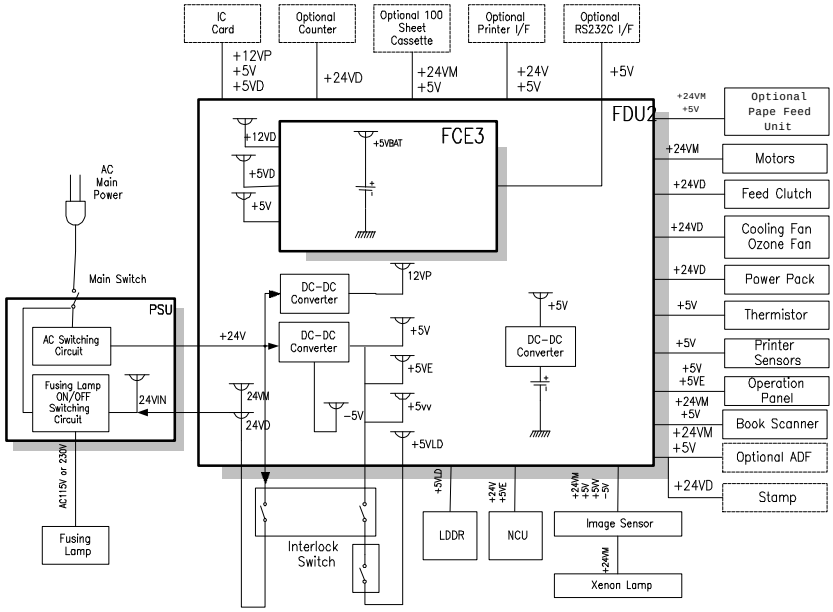
Technical Bulletin No. F/L Series - 041

SUBJECT: New Model LSOMkII

DATE: 1996. 8. 18

1.6. POWER DISTRIBUTION

1.6.1. Distribution Diagram



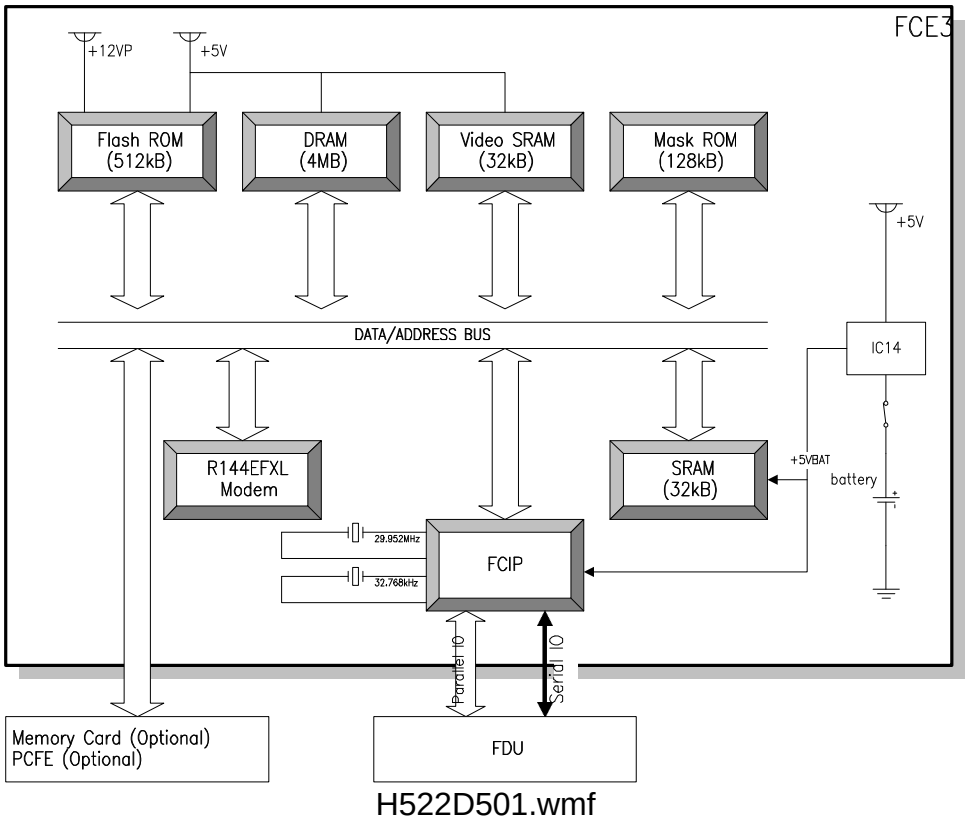
H522V504.wmf

The PSU supplies +24V dc power to the FDU. The FDU converts the +24V dc power supply to the following supplies.

+5V	This is normally on when the main switch is on.
+5VE	This is used for detecting an activation signal from the NCU, document feeder, or operation panel when the machine is in energy saving mode.
+5VLD	This supplies the laser diode. It is interrupted if the fusing unit cover interlock switch opens.
+5VV	This is a more stable power supply than +5V. It is used for the Contact Image Sensor.
+5VD	This supplies back up power for the DRAM and the optional IC card on the FCE. It can back up stored data for one hour after the power is switched off. A rechargeable battery on the FDU is used to generate +5VD.
+5VBAT	This supplies back up power to the system RAM on the FCE to back up the programmed data. A lithium battery is used to generate +5VBAT.
+24V	This is normally on when the main switch is on.
+24VD	This is interrupted if the fusing unit cover interlock switch opens.
+24VIN	This supplies +24V to the fusing unit on/off switching circuit. It is interrupted if the fusing unit cover interlock switch opens.
+24VM	This is interrupted if the machine enters energy saving mode.
-5V	This is used for the image sensor.
+12VP	This is supplied to the Flash ROM on the FCE and the optional IC card.

2.4. PCBs

2.4.1. FCE3



H522D501.wmf

1. FCIP (Facsimile Controller and Image Processor)

- CPU
- Modem (V.21, tone generator)
- Data compression and reconstruction (DCR)
- Digital image processor (DIP)
- Laser interface (LIF)
- DMA controller
- Clock generation
- Stepper motor control
- Serial interface to the FDU
- DRAM backup control
- Ringing signal/Tone detection
- Fusing lamp control

RICOH **Technical Bulletin No. F/L Series - 041**

SUBJECT: New Model LSOMkII

DATE: 1996. 8. 18

2. Modem (Rockwell R144EFXL)
- V.33 / V.29 / V27ter. modem

3. ROM
- 512 kB (4 Mbit) flash ROM for system software storage.
- 128 kB (1 Mbit) mask ROM for LCD wording data storage (not used in the US model)

4. DRAM
- 2x2 MB DRAM shared between the line buffer (32 KB), ECM buffer (128 KB), Page memory (3 MB), and SAF memory (640‘ KB).
- Backed up by the battery on the FDU.

5. SRAM
- 32 kB SRAM for system and user parameter storage.
- Backed up by the battery on the FCE.

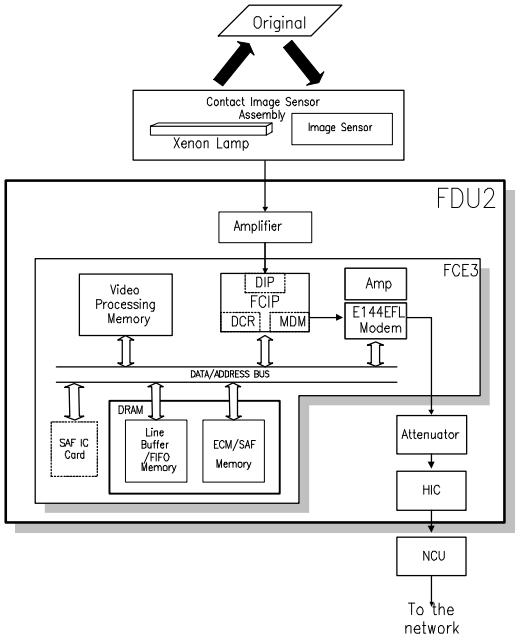
6. Video SRAM
- 32 KB SRAM for video processing.

7. Oscillators
- 29.952 MHz oscillator for system clock generation.
- 32.768 MHz oscillator for the real time clock. This is backed up by the battery on the FCE.
- 38.00053 MHz oscillator for the R144EFXL modem.

8. Jumpers, Switches, and Test Points

Item	Description
SW1	Switches the backup battery ON/OFF

2.4.2. FDU2



H522D502.wmf

1. Power Saver CPU
- 4 bit CPU for controlling the machine during power saver mode.

2. PSIF (Peripheral Serial I/F)
- One of the gate-array controlling the paper feed motor,and catch the ADF sensor's data, and the book-size sensor's data.

3. EXIO (External I/O)
- Serial interface to the FCE and OPU.
- Serial interface to an optional paper feed unit.
- Parallel interface to the main motor, clutches, and sensors.

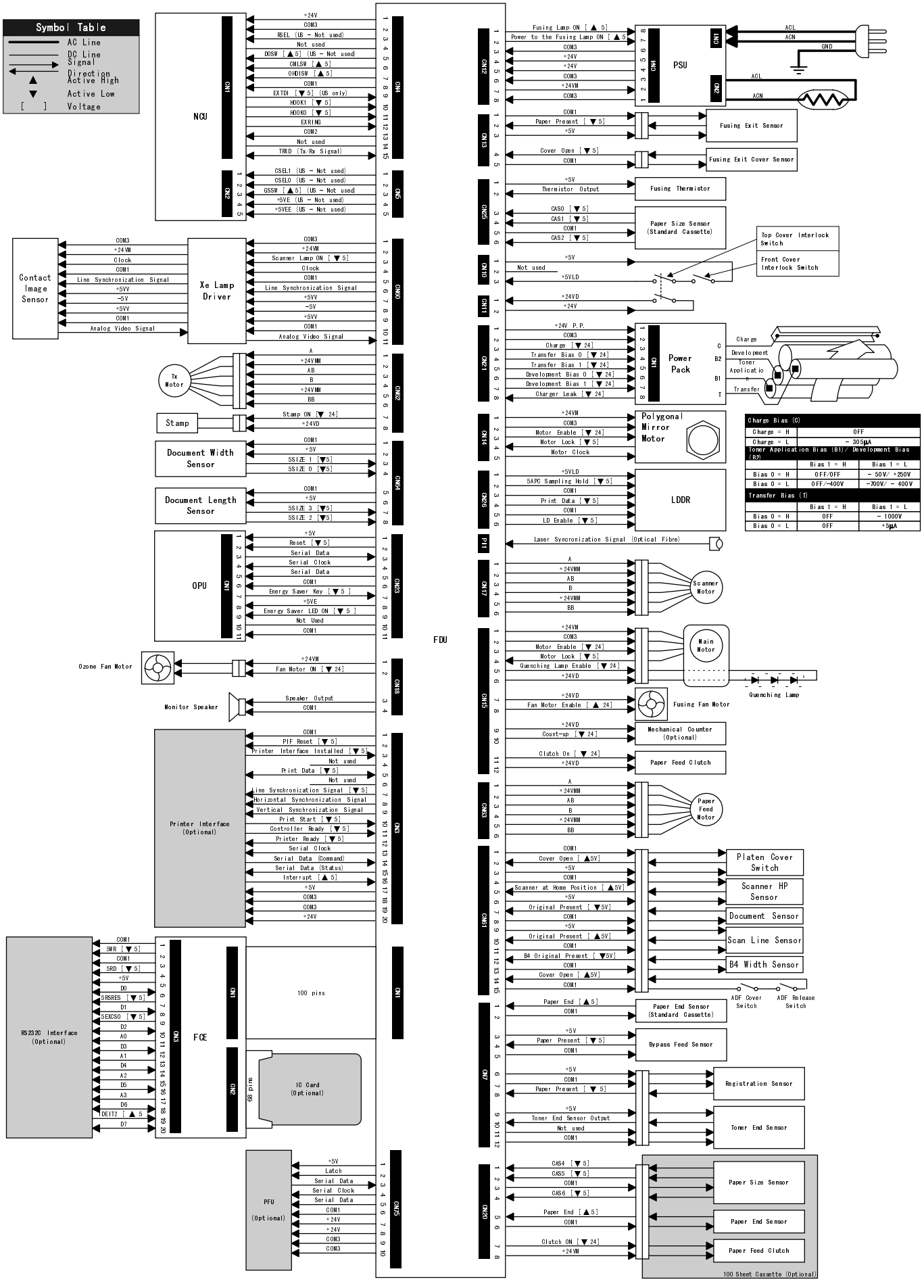
4.Motor Driver (SLA7024M)
- Controlling the ADF motor, and the scanner motor.(Except the paper feed motor)

5. HIC (Hybrid IC)
- 2-4 wire switching
- Filters and amplifiers
- Monitor speaker driver

6. DC/DC Converters
- +5V generation
- 12V generation

Point-to-Point Diagram
Model: LSO-MKII

Issued on: August 28th, 1996
Revision 1.0
Subject to change



LSO

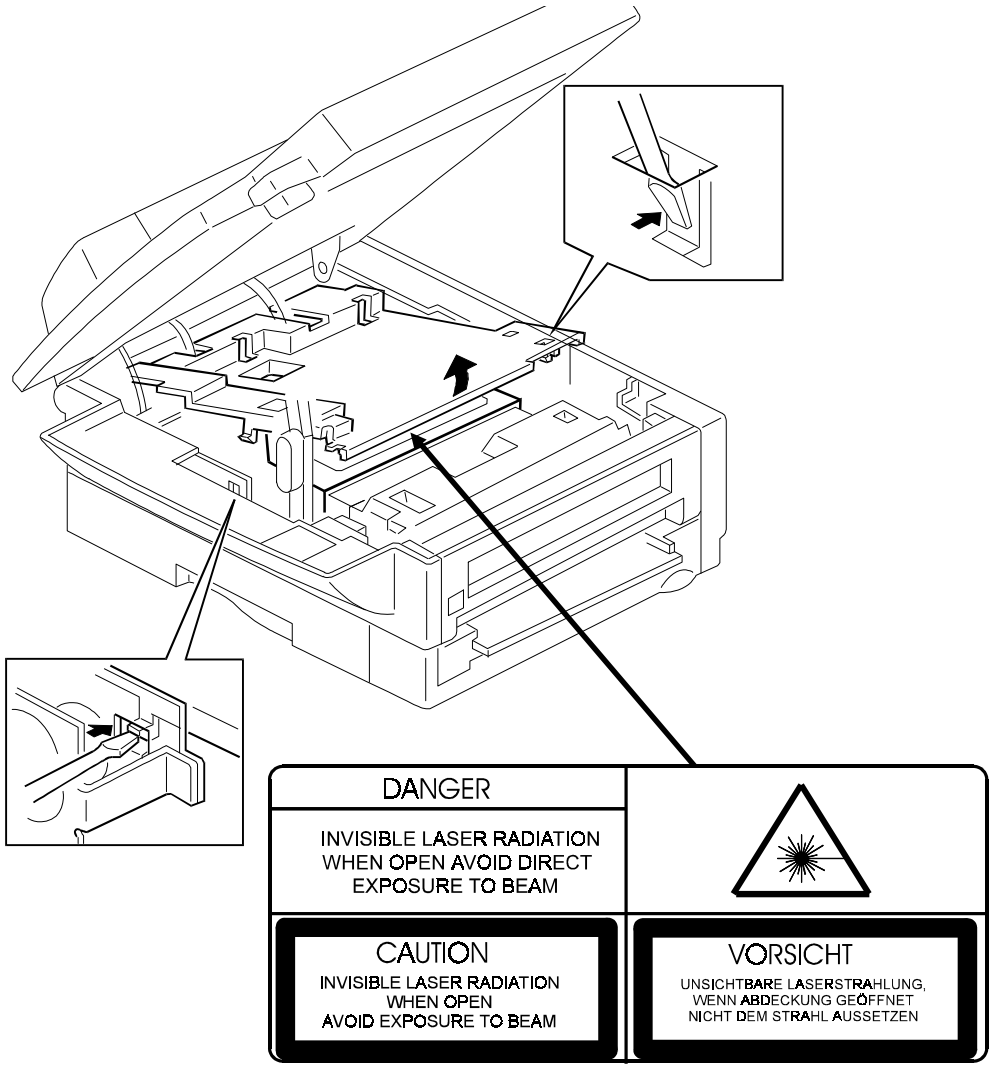
RICOH MV310

SERVICE MANUAL

May 22nd, 1995
Subject to change

⚠WARNING

THIS MACHINE CONTAINS A LASER BEAM GENERATOR. LASER BEAMS CAN CAUSE PERMANENT EYE DAMAGE. DO NOT OPEN THE LASER UNIT OR LOOK ALONG THE LASER BEAM PATH WHILE THE MAIN POWER IS ON.



Lithium Batteries (Memory Back-up)

⚠CAUTION

The danger of explosion exists if a battery of this type is incorrectly replaced. Replace only with the same or an equivalent type recommended by the manufacturer. Discard used batteries in accordance with the manufacturer's instructions.

Table of Contents

1. OVERALL MACHINE INFORMATION

1.1. SPECIFICATIONS 1-1
1.2. FEATURES 1-3
1.3. COMPONENT LAYOUT 1-6
1.3.1. Mechanical Components 1-6
1.3.2. Electrical Components 1-8
1. PCBs 1-9
2. Motors and Clutches 1-9
3. Sensors 1-10
4. Interlock Switches 1-10
5. Others 1-11
6. Options 1-12
1.4. OVERALL MACHINE CONTROL 1-13
1.5. VIDEO DATA PATH 1-14
1.5.1. Transmission 1-14
1.5.2. Reception 1-15
1.5.3. Copying 1-16
1.5.4. Printing using the Optional Printer Interface 1-18
1.6. POWER DISTRIBUTION 1-19
1.6.1. Distribution Diagram 1-19
1.6.2. Memory Back-up Circuit 1-20

2. DETAILED SECTION DESCRIPTIONS

2.1. SCANNER 2-1
2.1.1. Overview 2-1
1. Book Scanner 2-1
2. ADF 2-2
2.1.2. Original Detection 2-3
1. Book Scanner 2-3
2. ADF 2-5
2.1.3. Scanning 2-6
1. Contact Image Sensor 2-6
2. Main Scan Resolution and Width (Book Scanner) 2-7
3. Main Scan Resolution and Width (ADF) 2-8
4. Sub Scan Resolutions and Length (Book Scanner) 2-8
5. Sub Scan Resolutions and Length (ADF) 2-8
6. Sub Scan Resolution Conversion 2-9
2.1.4. Drive Mechanism 2-10
1. Book Scanner 2-10
2. ADF 2-11

3. Scanner Position Fine Adjustment 2-12
2.1.5. Pick-up and Feed (ADF) 2-13
2.1.6. Separation Mechanism (ADF) 2-13
2.1.7. Stamping (ADF) 2-14
2.1.8. Error Conditions 2-15
1. Book Scanner 2-15
2. ADF 2-15
2.1.9. Video Processing 2-17
1. Analog Signal Processing 2-17
2. Digital Video Processing Steps 2-18
3. Video Processing Parameters 2-22
2.2. PRINTING 2-23
2.2.1. Printing Process - Overview 2-23
2.2.2. OPC Drum 2-24
2.2.3. Charge 2-24
2.2.4. Laser Exposure 2-26
1. Overview 2-26
2. Block Diagram **2-27**
3. Error Conditions 2-27
4. Print Density Adjustment 2-28
5. Enlargement 2-28
6. Toner Saving Mode **2-29**
2.2.5. Toner Supply 2-30
2.2.6. Development 2-33
2.2.7. Paper Feed 2-38
1. Overview 2-38
2. Paper Lift Mechanism 2-39
3. Paper Size and Paper End Detection 2-40
4. Pick-up and Separation 2-42
5. Drive Mechanism 2-42
2.2.8. Registration 2-45
2.2.9. Transfer and Separation 2-47
2.2.10. Cleaning 2-50
2.2.11. Fusing 2-51
2.2.12. Page Separation and Data Reduction 2-55
2.2.13. Paper Size Selection 2-57
2.3. SYSTEM FEATURES 2-58
2.3.1. Power Saver Modes 2-58
1. Going into a Power Saver Mode 2-59
2. Going into Level 2 Mode from Level 1 Mode 2-61
3. Receiving a Fax Message in Power Saver Mode 2-63
4. Sending a Fax Message or Copying in Power Saver Mode . 2-65
2.3.2. Automatic Service Calls 2-67
1. Service Call Conditions 2-67
2. Excessive Jam Alarms 2-68
3. Periodic Service Call 2-69

4. PM Call 2-70
5. Effective Term of Service Calls 2-70
2.4. PCBs 2-71
2.4.1. FCE 2-71
2.4.2. FDU 2-73
2.4.3. PSU 2-74
2.4.4. NCU (USA) 2-75
1. Jumpers 2-75
2.4.5. NCU (Europe/Asia) 2-76
1. Control Signals and Jumpers 2-76

3. INSTALLATION

3.1. INSTALLING THE MACHINE 3-1
3.2. INITIAL PROGRAMMING 3-1
3.3. OPTIONAL UNITS 3-2
3.3.1. Counter 3-2
3.3.2. Printer Interface 3-3

4. SERVICE TABLES AND PROCEDURES

4.1. SERVICE LEVEL FUNCTIONS 4-1
4.1.1. Bit Switch Programming (Function 01) 4-1
4.1.2. System Parameter List (Function 02) 4-2
4.1.3. Error Code Display (Function 03) 4-2
4.1.4. Service Monitor Report (Function 04) 4-2
4.1.5. Protocol Dump (Function 05) 4-3
4.1.6. RAM Display/Rewrite (Function 06) 4-3
4.1.7. RAM Dump (Function 06) 4-4
4.1.8. Counter Display/Rewrite (Function 07) 4-4
4.1.9. NCU Parameters (Function 08) 4-5
4.1.10. Modem Test (Function 08) 4-6
4.1.11. DTMF Tone Test (Function 08) 4-6
4.1.12. Modem Detection Test (Function 08) 4-7
4.1.13. Ringer Test (Function 08) 4-7
4.1.14. Operation Panel Test (Function 09) 4-8
4.1.15. LED Array Test (Function 10) 4-8
4.1.16. ADF Test (Function 10) 4-9
4.1.17. Book Mode Scanner Mechanism Test (Function 10) . . . 4-9
4.1.18. Auto Paper Select Mode Test (Function 10) 4-10
4.1.19. Image Sensor Check/Clock Reset (Function 10) 4-10
4.1.20. Printer Test Patterns (Function 11) 4-11
4.1.21. Printer Mechanism Test - Free Run (Function 11) 4-12
4.1.22. RAM Tests (Function 12) 4-12
4.1.23. Software Download (Function 12) 4-13

4.1.24. Software Upload (Function 12) 4-14
4.1.25. SRAM Data Download (Function 12) 4-15
4.1.26. Serial Number (Function 14) 4-16
4.1.27. Service Station Telephone Number (Function 13) 4-17
4.2. BIT SWITCHES 4-18
4.2.1. System Switches 4-18
4.2.2. Scanner Switches 4-28
4.2.3. Printer Switches 4-29
4.2.4. Communication Switches 4-32
4.2.5. G3 Switches 4-38
4.3. NCU PARAMETERS 4-44
4.4. DEDICATED TRANSMISSION PARAMETERS 4-72
4.4.1. Programming Procedure 4-72
4.4.2. Parameters 4-73
4.5. SERVICE RAM ADDRESSES 4-75
4.6. SPECIAL TOOLS AND LUBRICANTS 4-87
4.7. PM TABLE 4-87

5. REPLACEMENT AND ADJUSTMENT

5.1. EXTERIOR 5-1
5.1.1. ADF 5-1
5.1.2. Operation Panel and Copy Tray 5-3
5.1.3. Platen Cover and Original Scales 5-3
5.1.4. Top Cover and Exposure Glass 5-4
5.1.5. Left, Front, and Rear Cover 5-4
5.2. SCANNER 5-5
5.2.1. Contact Image Sensor 5-5
5.2.2. Fluorescent Lamp Stabilizer 5-6
5.2.3. Original Size, Platen Cover, and Scanner H. P. Sensors . . 5-6
5.2.4. Scanner Motor 5-7
5.3. LASER PRINTING COMPONENTS 5-7
5.3.1. Inner Cover 5-7
5.3.2. Laser Unit 5-8
5.3.3. Laser Diode Unit and Hexagonal Mirror Motor 5-9
5.4. DEVELOPMENT 5-10
5.4.1. Master Drum 5-10
5.4.2. Development Unit 5-10
5.4.3. Transfer Roller 5-11
5.4.4. Main Motor and Gears 5-11
5.4.5. Replacing the Development Unit 5-12
5.5. FUSING 5-15
5.5.1. Thermistor 5-15
5.5.2. Fusing Unit 5-15
5.5.3. Hot Roller Strippers 5-17
5.5.4. Fusing Lamp 5-17

5.5.5. Hot Roller 5-18
5.5.6. Pressure Roller 5-20
5.5.7. Thermostat and Thermofuse 5-20
5.6. PAPER FEED 5-21
5.6.1. Paper Feed Roller and Clutch 5-21
5.6.2. Paper End Sensor 5-21
5.6.3. Registration Sensor and Pressure Rollers 5-22
5.6.4. Paper Feed Motor, Gears and Registration Roller 5-22
5.6.5. Bypass Feed Sensor 5-23
5.6.6. Paper Size Sensor 5-23
5.7. PCBs 5-24
5.7.1. PSU 5-24
5.7.2. NCU 5-24
5.7.3. FDU and FCE 5-25
5.7.4. Power Pack 5-26
5.8. OTHERS 5-26
5.8.1. Ozone Filter and Fan Motor 5-26
5.8.2. Toner End Sensor 5-27
5.9. ADF 5-27
5.9.1. ADF Roller Asssembly and Covers 5-27
5.9.2. Pick-up Roller 5-28
5.9.3. Feed Roller 5-28
5.9.4. Separation Roller 5-29
5.9.5. ADF Motor and Covers 5-29
5.9.6. R0 and R1 Rollers 5-30
5.9.7. R2 Roller 5-30
5.9.8. Document Sensor and Width Sensor 5-31
5.9.9. Scan Line Sensor 5-32
5.9.10. Cover Sensors 5-32
5.10. 100 SHEET PAPER CASSETTE (OPTIONAL) 5-34
5.10.1. Relay Connector and Gear Cover 5-34
5.10.2. Paper End Sensor and Drive Components 5-35
5.10.3. Paper Size Sensor 5-36
5.11. IMAGE ADJUSTMENT 5-37
5.11.1. Overview 5-37
5.11.2. Scanner Parameters 5-38
1. Contrast 5-38
2. Margins 5-38
5.11.3. Printer Parameters 5-40
1. Margin (Main Scan Direction) 5-40
2. Margin (Sub Scan Direction) 5-41
5.11.4. Scanner Video Processing Parameters 5-42
1. Contrast 5-42
2. Image Processing Parameters Adjustment 5-43

6. TROUBLESHOOTING

6.1. COPY QUALITY TROUBLESHOOTING 6-1
6.1.1. Blank Copies 6-2
6.1.2. Black Copies 6-4
6.1.3. Dirty Background 6-5
6.1.4. Uneven Image Density 6-6
6.1.5. Vertical Black Lines 6-7
6.1.6. Horizontal Black Lines 6-8
6.1.7. Vertical White Lines 6-9
6.1.8. Horizontal White Lines 6-10
6.1.9. Black Dots/Spots 6-11
6.1.10. White Spots in Black Image Areas 6-12
6.1.11. Faint Copies 6-13
6.1.12. Vertical Black Band 6-15
6.1.13. Unfused Copies 6-16
6.1.14. Ghost Image 6-16
6.1.15. Toner on the Back of the Printer Paper 6-17
6.1.16. Misaligned Output (Data shifted to the right or left) . . . 6-18
6.1.17. Misaligned Output (Image shifted vertically)/Reduced Image 6-18
6.2. MECHANICAL PROBLEMS 6-19
6.2.1. ADF 6-19
1. Non Feed 6-19
2. Jam 6-20
3. Skew 6-21
4. Multi-feed 6-21
6.2.2. Book Scanner 6-22
1. Abnormal Noise 6-22
2. Scanner Home Position Error (Error Code 9-11) 6-22
3. Automatic Paper Selection Error 6-23
4. Scanning Start Position Error (Error Code 1-09) 6-23
6.2.3. Printer 6-24
1. Non-feed 6-24
2. Paper Jam - Inside the Printer 6-25
3. Jam - Fusing Exit 6-26
4. Skew 6-27
5. Multi-feed 6-27
6.3. SERVICE CALL CONDITIONS 6-28
6.4. ERROR CODES 6-32
6.5. ELECTRICAL COMPONENT DEFECTS 6-39
6.5.1. Defective Sensor Table 6-39
6.5.2. Blown Fuse Table 6-40

1. OVERALL MACHINE INFORMATION

1.1. SPECIFICATIONS

Type
Desktop transceiver

Circuit
PSTN, PABX

Connection
Direct couple

Book Scanner
Document Size:
Smaller than 257 x 364 mm
[10.1 x 14.3 ins]
Thickness: Less than 30 mm
Weight: Less than 5 kg

ADF
Document Size
Length: 105 - 364 mm
[4.1 - 16.5 ins]
Up to 1200 mm [47.2 ins], manually assisted
Width: 148 - 257 mm
[5.8 - 10.1 ins]
Thickness: 0.05 to 0.2 mm [2 to 8 mils]
(equivalent to 50 - 90 g/m^2)
0.04 to 0.4 mm [1.6 to 16 mils], manually assisted
(equivalent to 40 - 120 g/m^2)

Document Feed
Automatic feed, face up

ADF Capacity
30 sheets (using 20 lb paper)

Scanning Method
Contact image sensor, with xenon lamp

Maximum Scan Width
256 mm [10.1 ins] ± 0.25%

Scan Resolution
Fax mode
Standard: 8 x 3.85 lines/mm [203 x 98 dpi]
Detail: 8 x 7.7 lines/mm [203 x 196 dpi]
Fine: 8 x 15.4 lines/mm [203 x 392 dpi]
Copy mode:
16 x 15.4 lines/mm [406 x 392 dpi]

Memory Capacity
ECM: 64 or 128 kB; single or double buffer
SAF: 576 kB (45 pages/A4)

Protocol
Group 3 with ECM

Compression
MH, MR, EFC, MMR, SSC (MMR only with ECM)
Storage to SAF memory for tx: MMR and/or raw data

Modulation
V.29 (QAM), V.27ter (PHM), V.21 (FM)

Data Rate (bps)
9600/7200/4800/2400, Automatic fallback

I/O Rate
With ECM: 0 ms/line
Without ECM: 2.5, 5, 10, 20, or 40 ms/line

Transmission Time
9 s at 9600 bps; Measured with G3 ECM using memory for a CCITT #1 test document (Slerexe letter) using standard resolution

Printing System
Laser printing, plain paper, dry toner

Printing Time
10 ppm for A4 size paper

Paper Size
Standard Cassette:
USA: Half-Letter, Letter, Legal
Europe/Asia: A4, A5, B5, F, F4
Optional 100 Sheet Cassette:
USA: Half-letter, Letter, Legal
Europe/Asia: A4, A5, B5 lengthwise, F/F4

Paper Capacity
Standard Cassette: - 250 sheets
Optional 100 Sheet Cassette:
- 100 sheets
Bypass Feeder: - 1 page

Maximum Printing Width
248 mm [9.8 ins]

Printer Resolution
Fax/Copy Mode: 16 x 15.4 lines/mm
[406 x 392 dpi]
Printer Mode: 300 x 300 dpi

Power Supply
USA: 115 ± 20 Vac, 60 ± 1 Hz
Europe/Asia: 220 Vac +20/-10%, 50 ± 1 Hz

Power Consumption
Standby: Minimum 2 W, Normal 70 W
Transmitting: 35 W
Receiving: 200 W
Copying: Normal 300 W, Maximum 800 W

Operating Environment
Temperature: 17 - 28 °C [63 - 82 °F]
Humidity: 40 - 70 %Rh

Dimensions (W x D x H)
555 x 555 x 342 mm [21.9 x 21.9 x 13.5 ins]
Excluding handset, trays, and optional units

Weight
30 kg [66 lbs]
Excluding handset, trays, and optional units

1.2. FEATURES

KEY: O = Used, X = Not Used
A = With optional 100 sheet cassette only
B = With optional counter only
C = With optional handset only
D = With printer interface only

Equipment	
ADF	O
Book scanner	O
Built-in handset	X
Bypass feed: 1 sheet	O
Optional cassette: 100 sheets	A
Cabinet	X
Counter	B
Cutter	X
Handset	C
Hard disk	X
Manual feed mechanism	X
Marker (Stamp)	O
Monitor speaker	O
Printer interface option	D

Video Processing Features	
Contrast	O
Auto image density control	O
Halftone (Basic & Error Diffusion)	O
MTF	O
Reduction (Fax)	O
Resolution	O
Smoothing to 16 x 15.4 l/mm (Fax)	O

Communication Features - Auto	
Automatic fallback	O
Automatic redialing	O
Confidential reception	X
Dual Access	O
Substitute reception	O

Communication Features - User Selectable	
Action as a transfer broadcaster	X
Al Redial (last ten numbers)	X
Answering machine interface	X
Authorized Reception	O
Auto-answer delay time	X

Communication Features - User Selectable	
Auto dialing (pulse or DTMF)	O
Auto Document	X
Auto image density selection	O
Automatic Voice Message	X
Batch Transmission	X
Broadcasting	O
Chain Dialing	X
Communication Result Display	X
Confidential ID Override	X
Confidential Transmission	X
Direct Fax Number Entry	O
Economy Transmission	X
Fax on demand	X
Forwarding	X
Free Polling	X
Groups (3 groups)	O
Group Transfer Station	X
Hold	X
ID Transmission Option	X
Immediate Redialing	O
Immediate transmission	O
Keystroke Programs	X
Memory transmission	O
Multi-step Transfer	X
Next Transfer Station	X
OMR	X
On Hook Dial	O
Ordering Toner	X
Page Count	O
Personal Codes	X
Personal Codes with Conf. ID	X
Polling Reception	O
Polling Transmission	X
Polling tx file lifetime in the SAF	X
Quick Dial (20 stations)	O
Reception modes (Fax, Tel, ~~Auto~~)	O
Reduction	O
Remote control features	X
Remote Transfer	X
Restricted Access	X
Secured Polling	X
Secured Polling with Stored ID Override	X
Secure Transmission	X
Send Later	O

Communication Features - User Selectable	
Silent ringing detection	X
Specified Image Area	X
Speed Dial (50 stations)	O
Super Fine Resolution (16 x15.4 l/mm : 400 x 400 dpi)	X
Telephone Directory	X
Tonal Signal Transmission	O
Transfer Request	X
Transmission Deadline (TRD)	X
Turnaround Polling	X
Two-step Transfer	X
Two in one	X
Voice Request (immed. tx only)	X

Communication Features - Service Selectable	
AI Short Protocol	O
Auto-reduction override option	O
Busy tone detection	O
Closed Network (tx and rx)	X
Continuous Polling Reception	X
Dedicated tx parameters	O
ECM	O
EFC	O
Inch-mm conversion	X
Page retransmission	O
Page separation mark	O
Protection against wrong conn.	O
Resol'n stepdown override option	X
Short Preamble	X
Well log	O

Copier Features	
Auto Image Density	O
Auto Paper Select (Book mode)	O
Reduction/Enlargement	O
Erase center/border	O
Distribution number printing	O
Center marks	O

Other User Features	
Area Code Prefix	X
Auto Service Call	O
Center mark	O
Checkered mark	X

Other User Features	
Clearing a memory file	O
Clearing a polling file	O
Clock	O
Confidential ID	X
Copy mode	O
Copy Mode Restriction	X
Counters	O
Daylight Saving Time **(USA only)**	O
Destination Check	X
Direct entry of names	O
File Retention Time	X
File Retransmission	O
Function Programs	X
ID Code	X
Label Insertion ("From xxx")	X
Language Selection	O
LCD contrast control	Service
Memory Lock	X
Memory Lock ID	X
Modifying a memory file	X
Multi Sort Document Reception	X
Multicopy mode (up to 99)	O
Own telephone number	X
Power Saver (Night Timer and standby mode)	O
Print density control	O
Printing a memory file	O
RDS on/off	O
Reception Mode Switching Timer	X
Reception time printing	X
Remaining memory indicator	O
Remote ID	X
Reverse Order Printing	X
RTI, TTI, CSI	O
Secure ID	X
Service Report Transmission	O
Speaker volume control	O
Specified Cassette Selection	X
Substitute reception on/off	O
Telephone line type	O
Toner saving mode	O
TTI on/off	O
User Function Keys	X
User Parameters	O
Wild Cards	O

Reports - Automatic	
Charge Control Report	X
Communication Failure Report	O
Confidential File Report	X
Error Report	O
Memory Storage Report	O
Mode Change Report	X
Polling Clear Report	X
Polling Reserve Report	O
Polling Result Report	O
Power Failure Report	O
TCR	O
Toner Cassette Order Form	X
Transfer Result Report	X
Transmission Result Report	O

Reports - User-initiated	
Authorized Reception List	O
Charge Control Report	X
File List	O
Forwarding List	X
Group List	O
Personal Code List	X
Program List	X
Quick Dial List	O
Specified Cassette Selection List	X
Speed Dial List	O
TCR	O
Transmission Status Report	X
User Function List	X
User Parameter List	O

Service Mode Features	
Auto Paper Select Test	O
Back-to-back test	O
Bit switch programming	O
Book Test	O
Buzzer test	O
Cable equalizer	O
Comm. parameter display	O
Counter check	O
Country code	O
DTMF tone test	O
Echo countermeasure	O
Effective term of service calls	O
Error code display	O
Excessive jam alarm	O

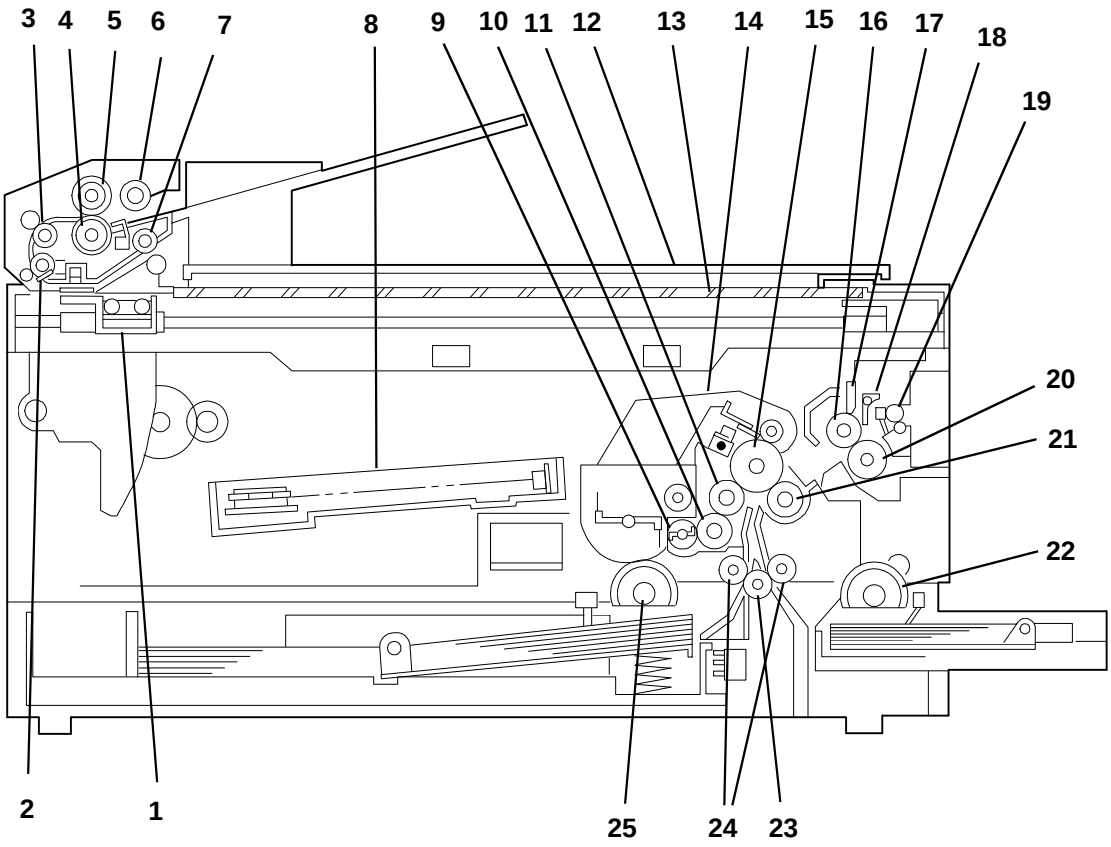
Service Mode Features	
File Transfer	O
Hex Dump List	E
LCD contrast adjustment	O
Line error mark	O
Memory file printout (all files)	O
Modem test	O
NCU parameters	O
Operation panel test	O
Periodic service call	O
PM Call	O
Printer mechanism test	X
Printer test patterns	O
Programmable attenuation	X
Protocol dump list	O
RAM display/rewrite	O
RAM dump	O
RAM test	O
Ringer test	X
Scanner lamp test	O
Scanner mechanism test	O
Sensor initialization	X
Serial number	O
Service monitor report	O
Service station number	O
Software upload/download	O
SRAM data download	O
Status Sheet	D
System parameter list	O
Technical data on the TCR	O
Thermal head parameters	X
Transmission Status Report	X
User data transfer	O

Memory Files

Max. number of files: 100
Max. number of stations/file: 100
Max. number of stations overall: 200
Max. number of pages overall: 150

1.3. COMPONENT LAYOUT

1.3.1. Mechanical Components

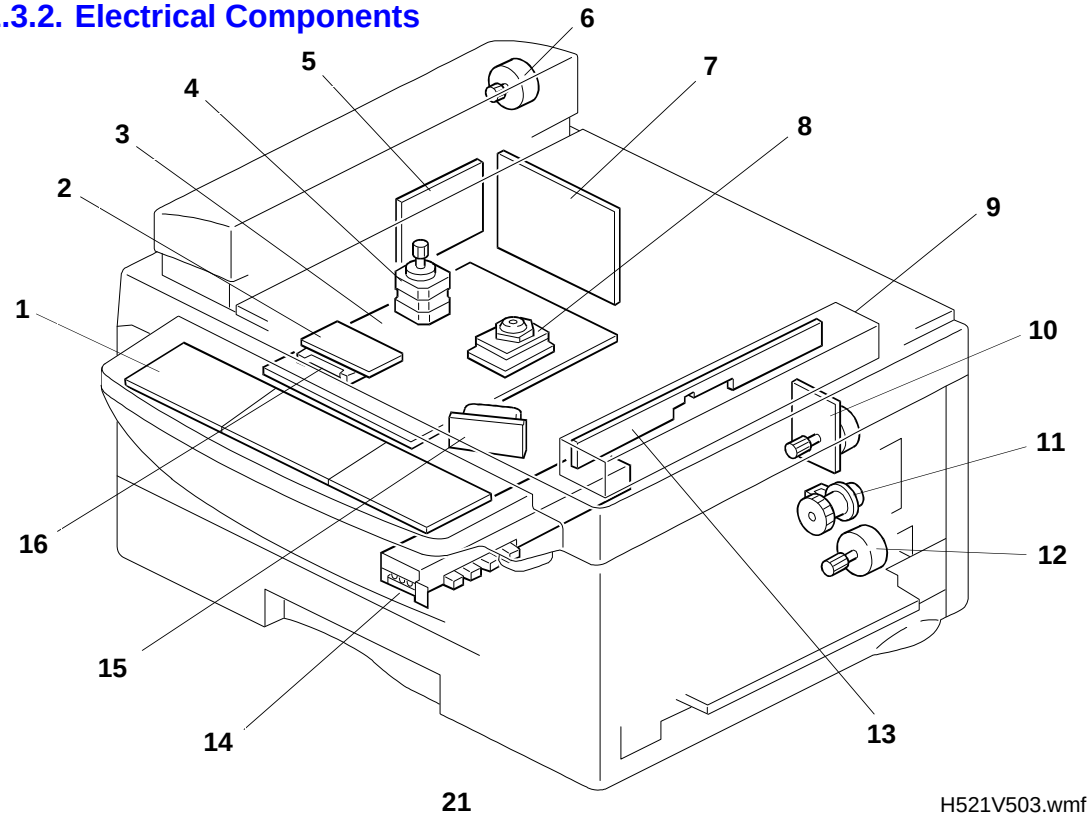


H521V501.wmf

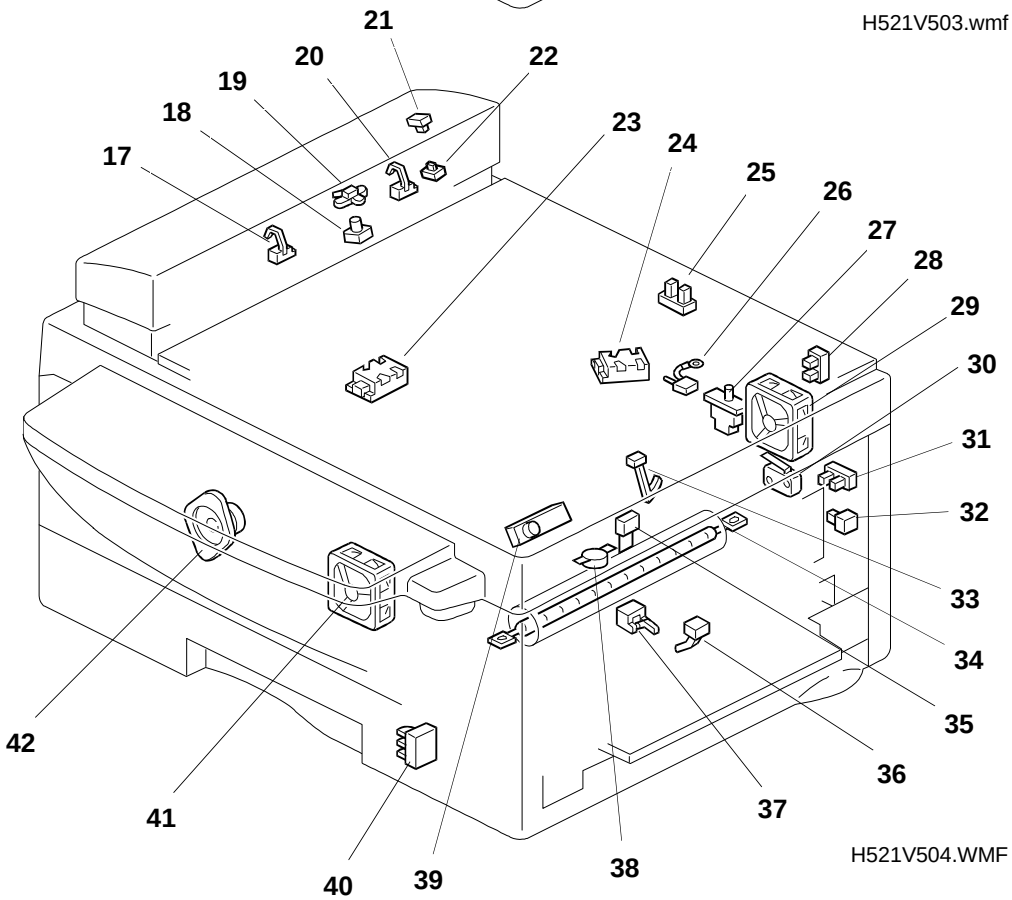
No.	Name	Description
1	Scanner	Contains a contact image sensor and a xenon lamp driver.
2	R1 Roller	Feeds the document through the scanner.
3	R0 Roller	Feeds the document into the scanner.
4	Separation roller	Prevents more than one sheet from feeding into the scanner.
5	Document Feed Roller	Feeds the document into the scanner.
6	Pick-up Roller	Picks up pages of the document from the document table one at a time.
7	R2 Roller	Feeds the document through the scanner.
8	Laser Unit	This consists of the LDDR (Laser Diode Driver), Focusing lens, Fθ Lenses, Hexagonal mirror motor, and other laser optic components.

No.	Name	Description
9	Toner Supply Bar	This stirs up and transfers toner to the toner application roller.
10	Toner Application Roller	This roller transfers toner to the development roller.
11	Development Roller	This roller applies toner to the latent image on the drum.
12	Platen Cover	This covers the original which was placed on the exposure glass.
13	Exposure Glass	Book scanner reads the original on it.
14	CTM (Cleaning Toner Magazine)	This consists of the toner cartridge, cleaning unit, used toner tank, charge corona unit, and quenching lamp.
15	OPC Drum	The latent image is written to this Organic Photoconductor Drum.
16	Hot Roller	Heat from this roller fuses the toner to the copy paper.
17	Cleaning Pad	This cleans up and spreads silicone oil on the surface of the hot roller.
18	Hot Roller Strippers	These take the paper off the hot roller after fusing.
19	Paper Feed-out Rollers	These feed the paper out of the printer.
20	Fusing Pressure Roller	This applies pressure to the paper during fusing.
21	Transfer Roller	This applies a charge to the paper to pull the toner off the drum and onto the copy paper.
22	Paper Feed Rollers (100 Sheet Cassette)	These pick up the top sheet of paper from the stack in the optional 100 sheet cassette and feed it into the printer.
23	Registration Roller	This carries out the registration process.
24	Paper Feed Pressure Rollers	These feed paper from the cassette or bypass feed slot into the printer.
25	Paper Feed Rollers	These pick up the top sheet of paper from the stack in the cassette and feed it into the printer.

1.3.2. Electrical Components



H521V503.wmf



H521V504.WMF

1. PCBs

No.	Name	Description
3	FDU (Facsimile Driver Unit)	This board contains drivers for the motors, a dc-dc converter, the energy saving mode cpu, and other drive electronics.
2	FCE (Facsimile Control Engine)	This board controls the machine. It contains the main cpu, flash ROM, system RAM, and so on.
5	NCU (Network Control Unit)	This board contains a relay and switches for interfacing the machine to the network and the handset.
1	OPU (Operation Panel Unit)	This board controls the operation panel.
7	PSU (Power Supply Unit)	This board supplies power to the machine, and switches the fusing lamp on/off.
15	LDDR (Laser Diode Driver)	This board drives the laser diode.
14	Power Pack	This supplies high voltages to the corona wire, transfer roller, and development bias terminal.
9	Contact Image Sensor and Xenon Lamp	This sensor reads and converts the light reflected from the document into an analog video signal. It uses an RMLA (Roof Mirror Lens Array) sensor unit. The xenon lamp which illuminates the document is contained in this unit.
16	IC Card	This contains a DRAM which is used as page memory for 400 x 400 dpi printing of incoming B4 faxes.

2. Motors and Clutches

No.	Name	Description
6	ADF Motor	This stepper motor drives the scanner.
10	Main Motor	This brushless dc motor drives the drum, fusing unit, development unit, and CTM.
12	Paper Feed Motor	This stepper motor drives the registration roller and the paper feed mechanisms in the cassettes.
8	Hexagonal Mirror Motor	This high-speed dc motor drives the hexagonal mirror in the laser printer optics.
41	Ozone Fan Motor	This removes ozone-laden air from the vicinity of the drum, and filters out the ozone.
29	Cooling Fan Motor	This cools the interior of the machine.
4	Scanner Motor	This stepper motor drives the book scanner.
11	Paper Feed Clutch	This transfers main motor drive to the cassette and bypass tray paper feed mechanisms.

3. Sensors

No.	Name	Description
17	Document Sensor	This detects the presence of a document in the feeder.
19	Scan Line Sensor	This detects when a page is approaching the auto shading position.
20	Document Width Sensor	This detects when a B4 width [10.1"] document has been placed in the feeder.
39	Toner End Sensor	This detects when the toner has run out.
40	Paper Size Detector	This detects the paper size installed in the cassette. The user must install the correct actuator.
33	Paper End Sensor	This detects when the paper in the cassette has run out.
37	Registration Sensor	This detects when paper has reached the registration roller.
31	Paper Feed-out Sensor	This detects when the paper has been fed out of the printer.
32	Paper Exit Cover Switch	This detects whether the paper feed-out cover is open or closed.
36	Bypass Feed Sensor	This detects when a sheet of paper has been inserted into the bypass feed slot. Then the registration roller feeds the paper a short distance into the machine to prepare for printing, and stops.
21	ADF Cover Switch	This detects whether the ADF cover is open or closed.
28	Scanner Home Position Sensor	This detects when the image sensor is at home position.
23 24	Paper Size Sensors	These detect the size of the paper which was placed on the exposure glass.
25	Platen Cover Sensor	This detects whether the platen cover is open or closed.
22	ADF Switch	This detects whether the ADF unit is open or closed.

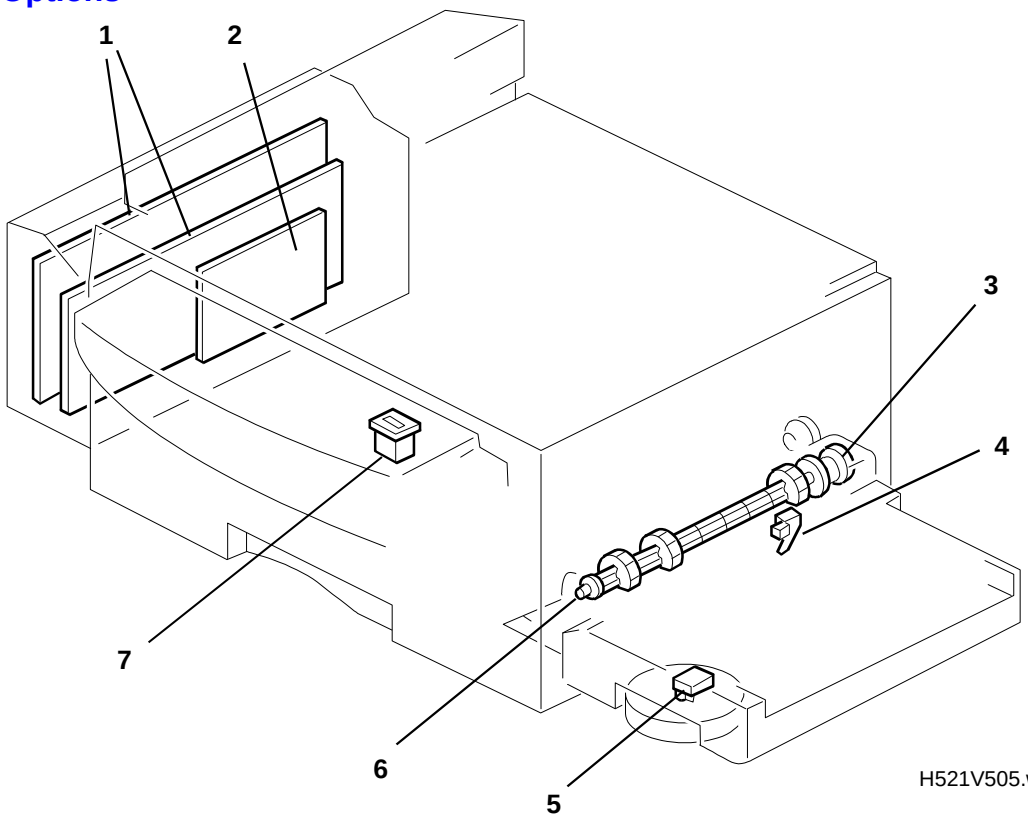
4. Interlock Switches

No.	Name	Description
27 30	Fusing Unit Cover Interlock Switches	If the fusing unit cover and/or top cover are open, these interlock switches interrupt the +5VLD power supply for the laser diode and the +24VD power supply for the power pack, motors, and other components.

5. Others

No.	Name	Description
18	Stamper Ass'y	This stamps a red circle on each page that is successfully fed through the scanner.
38	Thermostat	This interrupts the ac power supply to the fusing lamp if the temperature of the thermostat surface exceeds 400°C.
35	Thermistor	This monitors the temperature inside the fusing unit.
34	Fusing Lamp	This fuses the toner to the paper.
42	Monitor Speaker	This allows the user to listen to the condition of the telephone line.
26	Zener Diode	This ensures that the charge given to the drum by the charge corona wire does not exceed -750 volts.
13	Lamp Stabilizer	This supplies power to the xenon lamp.

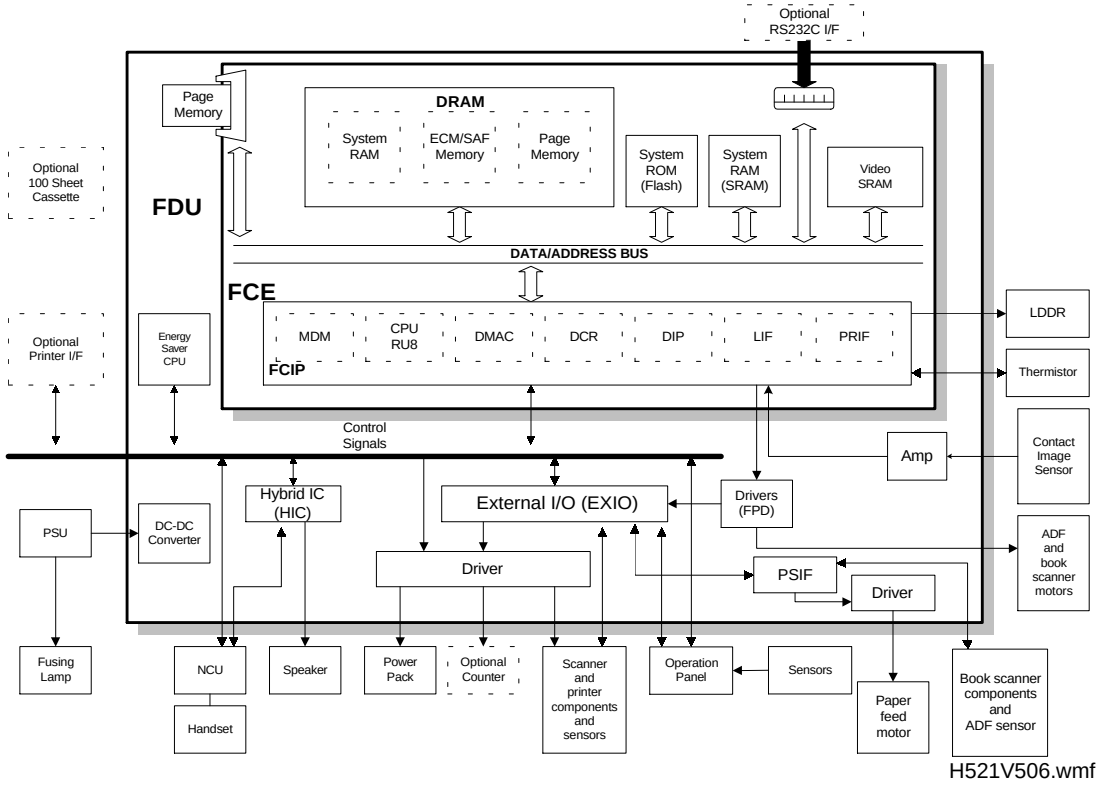
6. Options



No.	Name	Description
1	Printer Interface	This allows the machine to be connected to a computer as a laser printer.
2	RS232C Interface Board*	This allows the machine to be connected to a computer as an external fax device for example.
3	Paper Feed Clutch (100 Sheet Cassette)	This transfers motor drive to the mechanisms in the 100 sheet cassette.
4	Paper End Sensor (100 Sheet Cassette)	This detects when the paper in the optional 100 sheet cassette has run out.
5	Paper Size Detector (100 Sheet Cassette)	This detects the paper size installed in the optional 100 sheet cassette.
6	Paper Feed Roller (100 Sheet Cassette)	This feeds paper from the 100 sheet cassette into the machine.
7	Counter	This counts the number of prints.
8	100 Sheet Cassette	This increases the paper capacity of the machine, and allows the machine to have more than one paper size available at the same time.

* This option may not be available in some countries.

1.4. OVERALL MACHINE CONTROL



The FCE (Facsimile Control Engine) board contains the FCIP (Facsimile Control and Image Processor), DRAM, SRAM, System ROM, and video processing memory, and it controls the entire system through the FDU (Facsimile Driver Unit) board.

There are two cpus in the machine: the main cpu (FCIP) on the FCE board and the energy saver cpu on the FDU board. In energy saver mode, the main CPU switches off and the energy saver CPU takes over.

The FCIP consists of the following component blocks:

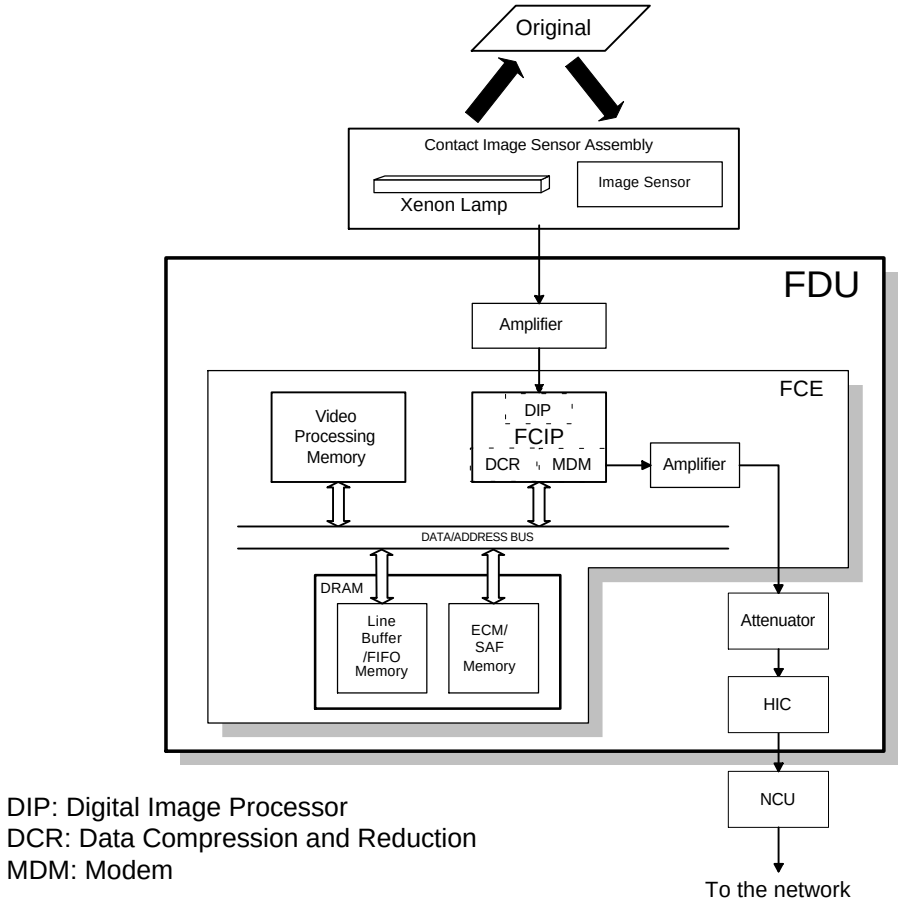
- RU8 CPU - Main CPU
- MDM - Modem
- LIF- Laser Interface
- DMAC - DMA Controller
- PRIF - Printer Interface
- DIP - Digital Image Processor
- DCR - Data Compression and Reconstruction

The 4 MB DRAM contains the SAF memory, ECM buffer memory, work area, and page memory. For B4 size copies at 16 x 15.4 dot/mm resolution, a page memory IC card is installed. A rechargeable battery backs up the DRAM for one hour.

The system ROM uses a 512 KB (4 Mbits) flash ROM. Software in this ROM can be rewritten from the IC card slot or by RDS.

1.5. VIDEO DATA PATH

1.5.1. Transmission



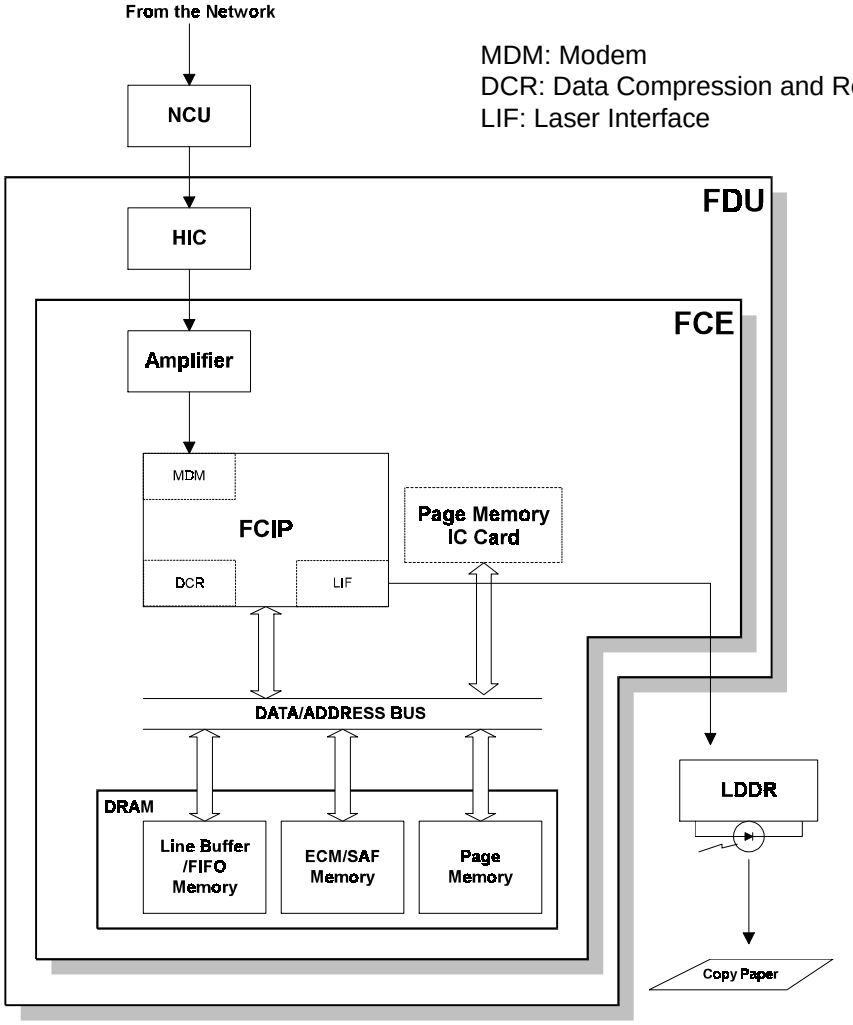
DIP: Digital Image Processor
DCR: Data Compression and Reduction
MDM: Modem

H521V507.wmf

Immediate Transmission:
Scanned data form the contact image sensor passes to the DIP block in the FCIP. After analog/digital video processing, the DCR block compresses the data for transmission. The compressed data then passes either to the FIFO memory or to the ECM memory, before it is sent to the telephone line through the modem.

Memory Transmission:
First, the scanned data is stored in the SAF memory after compression in the DCR block.
At the time for transmission, the DCR block decompresses the data from the SAF memory, then compresses it again after handshaking with the other terminal is done. The compressed data then passes either to the FIFO memory or to the ECM memory, before it is sent to the telephone line through the modem.

1.5.2. Reception



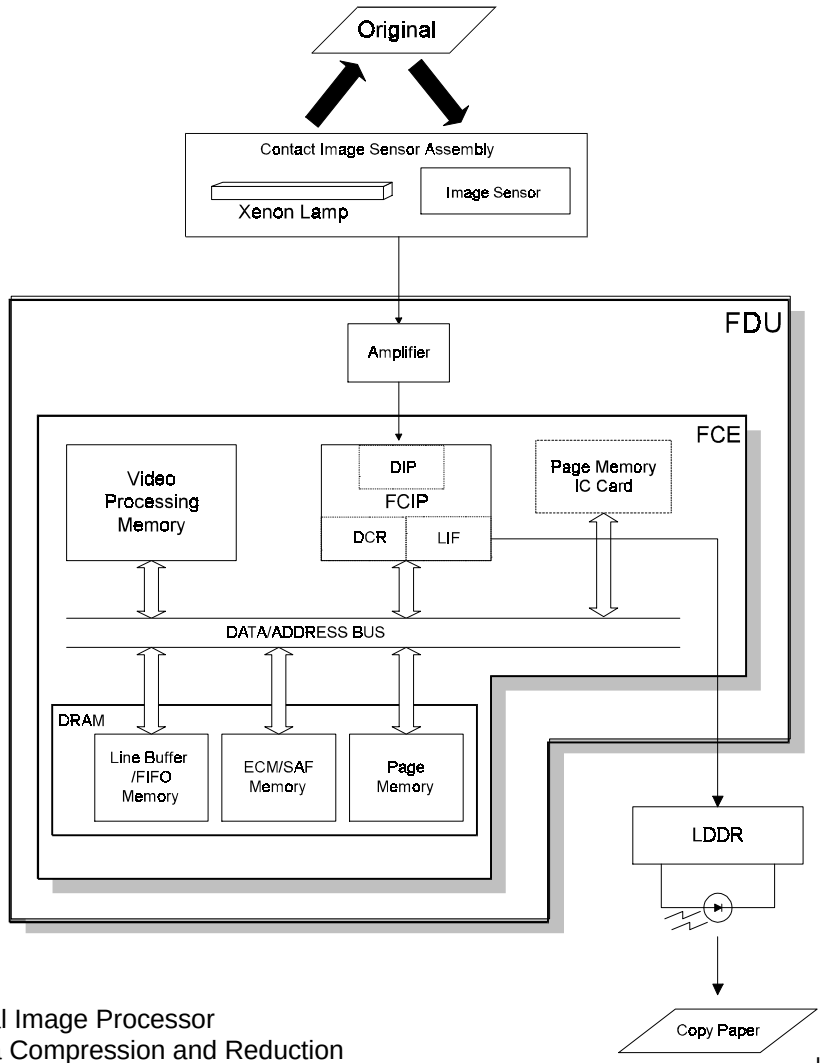
MDM: Modem
DCR: Data Compression and Reduction
LIF: Laser Interface

H521V508.wmf

Data from the line passes to the modem through the NCU and hybrid IC. After the modem demodulates the data, the data passes to the DCR block, through either the FIFO or the ECM memory, where the data is decompressed to raster image data. At the same time, the compressed data passes to the SAF memory as a backup in case of mechanical problems during printing (substitute reception).

The raster image data is then passed to the page memory for printing. After a page of data has been stored in the page memory, the data is sent to the LDDR through the LIF block.

1.5.3. Copying



DIP: Digital Image Processor
DCR: Data Compression and Reduction
LIF: Laser Interface

H521V509.wmf]

The scanned data passes to the page memory after video processing in the DIP block. After a page of data has been stored in the page memory, the data is sent to the LDDR through the LIF block.

Reproduction/Enlargement Ratios

The following reproduction ratios are available:

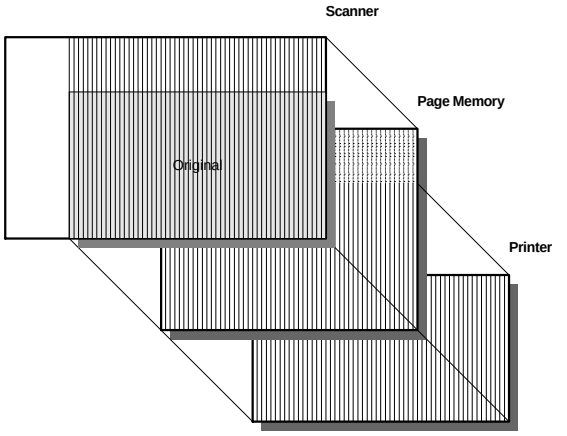
Reduction	50%	65%	71%	74%	77%	82%	87%	93%
US	Yes	Yes	No	Yes	Yes	No	No	Yes
Europe/Asia	Yes	No	Yes	No	No	Yes	Yes	Yes
Enlargement	115%	121%	122%	129%	141%	155%	200%	
US	No	Yes	No	Yes	No	Yes	Yes	
Europe/Asia	Yes	No	Yes	No	Yes	No	Yes	

Reduction and Enlargement

The reduction/enlargement process is done in two steps, one at the scanner, and the other at the printer.

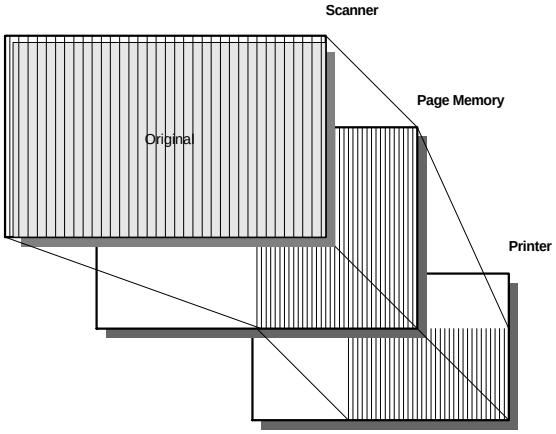
At the scanner, the machine changes the motor speed to get a reduced/enlarged image in the sub-scan direction. For example, the machine doubles the motor speed to get 50% reduction (halving the number of scan lines), and slows the motor speed down by half to get 200% enlargement (doubling the number of scan lines). The scanner always scans the full B4 (216 mm) width in the main scan direction. The scanned data is then stored in the page memory for printing.

At the printer, the machine deletes certain specified bits from each line to reduce the printing image in the main-scan direction. For example, every other bit is deleted to get a 50% reduced image.
Also, the machine changes the laser pulse width for each pixel to enlarge the printing image in the main-scan direction. For example, the machine doubles the pulse width to get a 200% enlarged image.



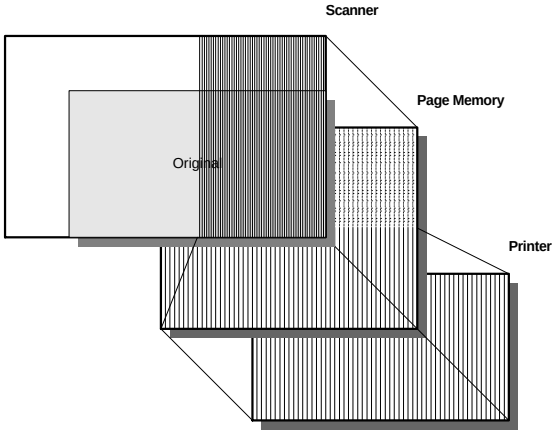
H521V513.wmf

Full Size



H521V514.wmf

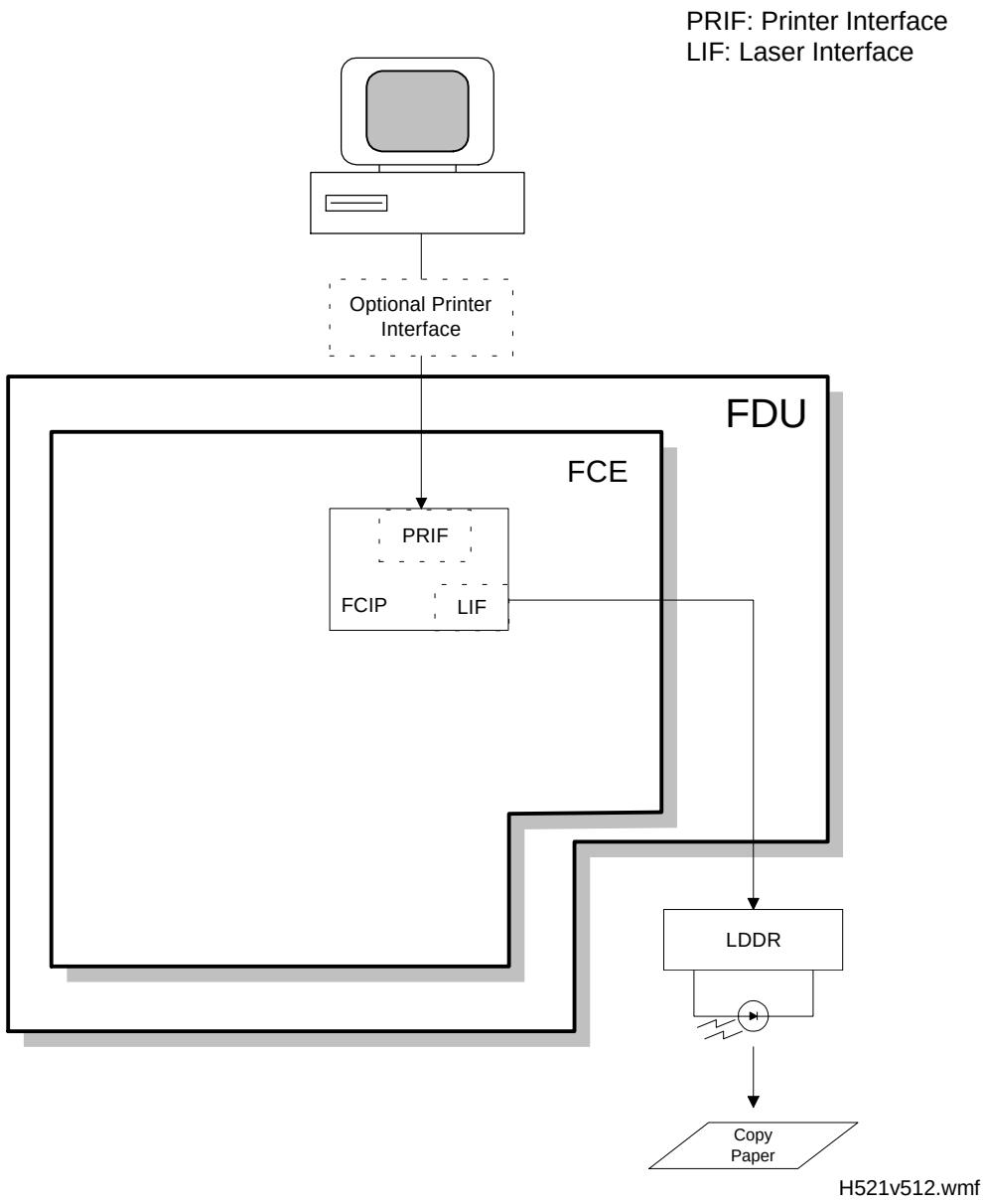
50% Reduction



H521V515.wmf

200% Enlargement

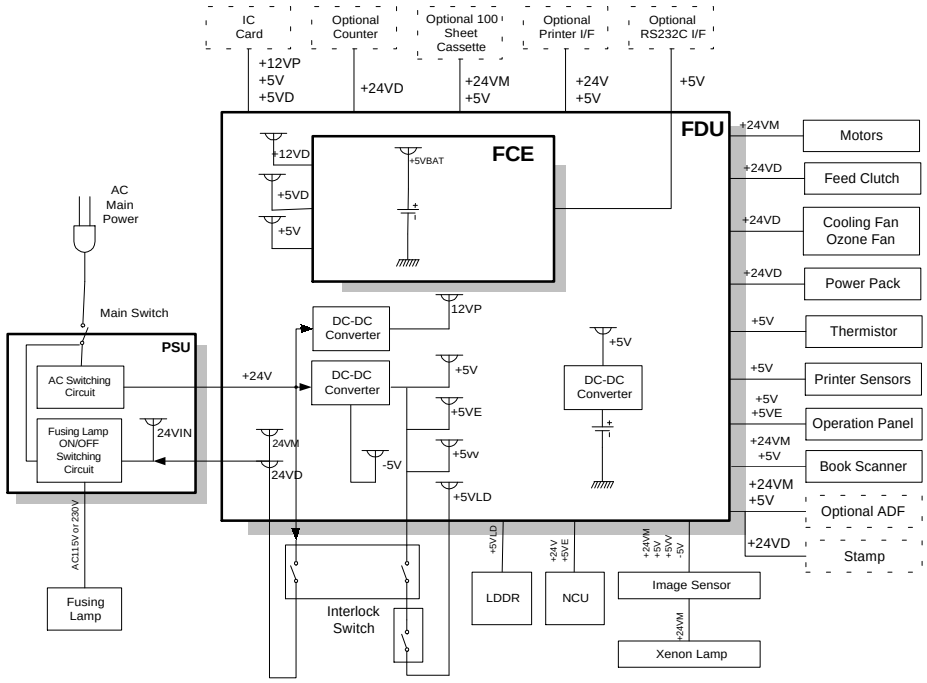
1.5.4. Printing using the Optional Printer Interface



After a page of data has been stored in the printer interface's page memory, the data is sent directly to the LIF through the PRIF (Printer Interface) block.

1.6. POWER DISTRIBUTION

1.6.1. Distribution Diagram

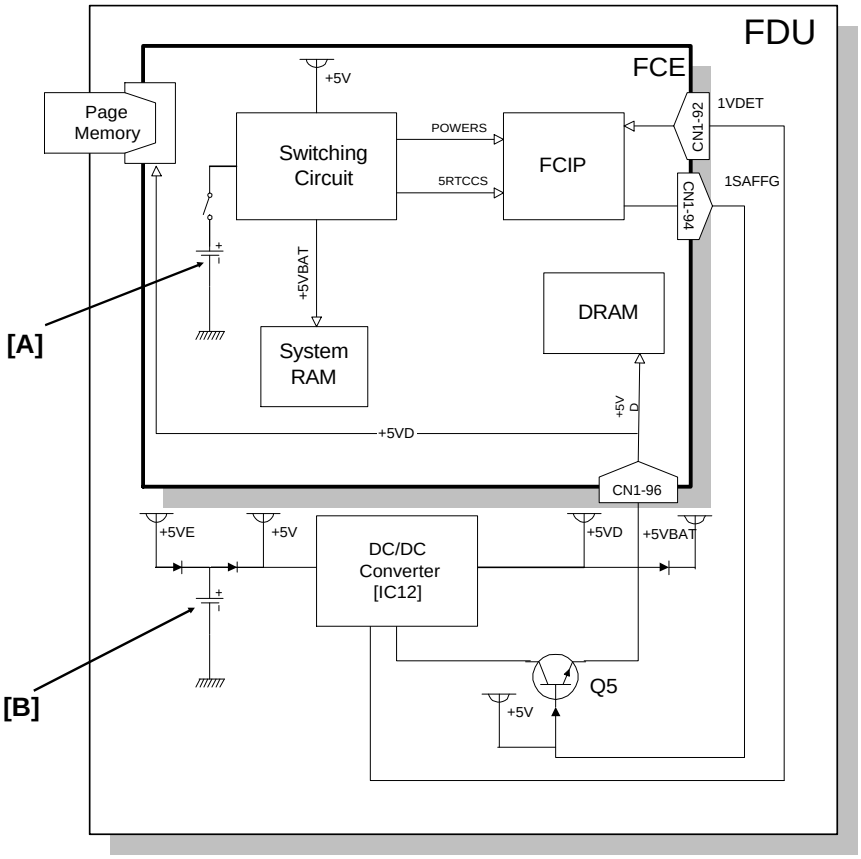


H521V510.wmf

The PSU supplies +24V dc power to the FDU. The FDU converts the +24V dc power supply to the following supplies.

+5V	This is normally on when the main switch is on.
+5VE	This is used for watching the activation signal when the machine is in energy saving mode.
+5VLD	This supplies the laser diode. It is interrupted if the fusing unit cover interlock switch opens.
+5VV	This is a more stable power supply than +5V. It is used for the image sensor.
+5VD	This supplies the DRAM and the page memory card on the FCE to back up the stored data for one hour, if the power is switched off and some data is stored in them. A rechargeable lithium battery is used to generate +5VD.
+5VBAT	This supplies the system RAM on the FCE to back up the programmed data, if the power is switched off. A lithium battery is used to generate +5VBAT.
+24V	This is normally on when the main switch is on.
+24VD	This is interrupted if the fusing unit cover interlock switch opens.
+24VIN	This supplies +24V to the fusing unit on/off switching circuit. It is interrupted if the fusing unit cover interlock switch opens.
+24VM	This is interrupted if the machine enters energy saving mode.
-5V	This is used for the image sensor.
+12VP	This is used for the page memory card.

1.6.2. Memory Back-up Circuit



H521V511.wmf

The +5VBAT supply from the lithium battery [A] backs up the system RAM which contains system parameters and programmed telephone numbers, and the real time clock in the main cpu. The 5RTCCS signal tells the main cpu whether the back-up power (+5VBAT) is coming from the battery or from the +5V power supply.

A rechargeable lithium battery [B] and the dc/dc converter on the FDU back up the DRAM (SAF memory) for one hour, if there is data in the SAF memory and the power is switched off. While the main power is on, the +5VE supply recharges the battery. The battery recharges in one or two days.

The battery [B] generates about 3 volts (max. 3.2 volts). The dc/dc converter (IC12) lifts this voltage to 5 volts so it can be used as the +5VD supply for SAF backup. The CPU monitors the voltage of the +5VD supply with the 1VDET signal. When the battery has run down, and the voltage is lower than 4.4 volts, the CPU stops the dc/dc converter by dropping 1SAFFG to low and the machine stops backing up the memory.

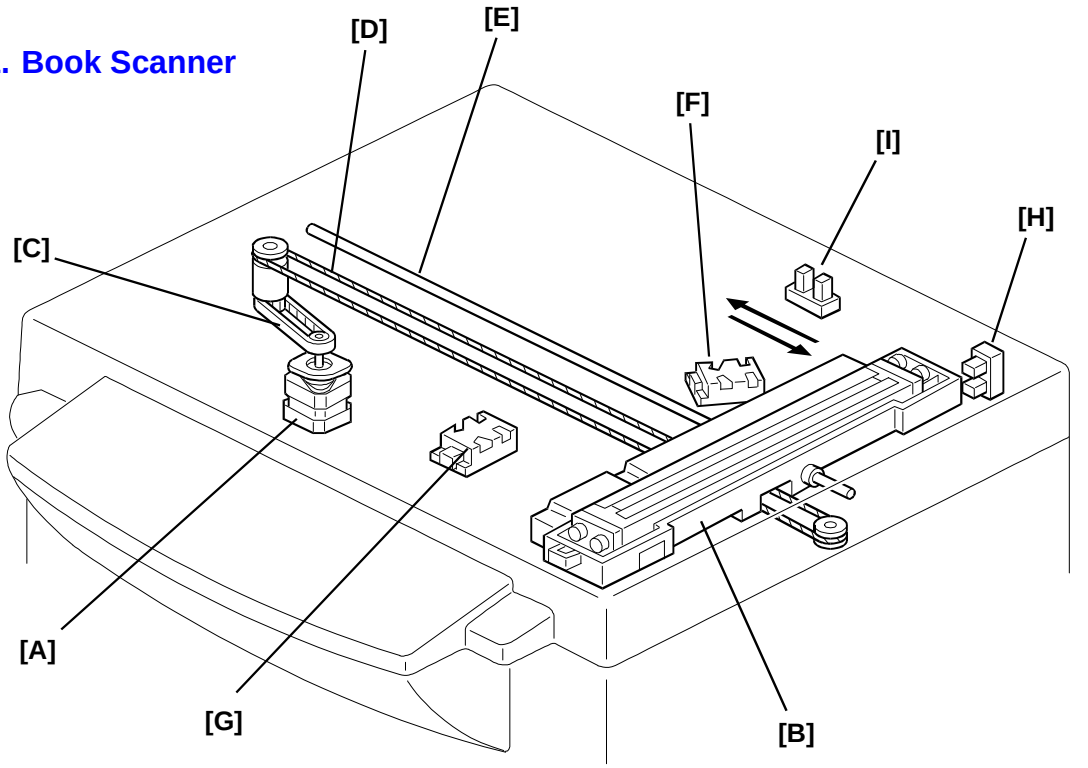
There is no battery switch for the battery [B].

2. DETAILED SECTION DESCRIPTIONS

2.1. SCANNER

2.1.1. Overview

1. Book Scanner



H521D011.wmf

The scanner motor [A] drives the scanner [B] through the timing belt [C] and drive wire [D]. The shaft [E] guides scanner movement in the sub-scan direction. Inside the scanner [B] are a contact image sensor (containing a sensor element and xenon lamp) and a xenon lamp driver.

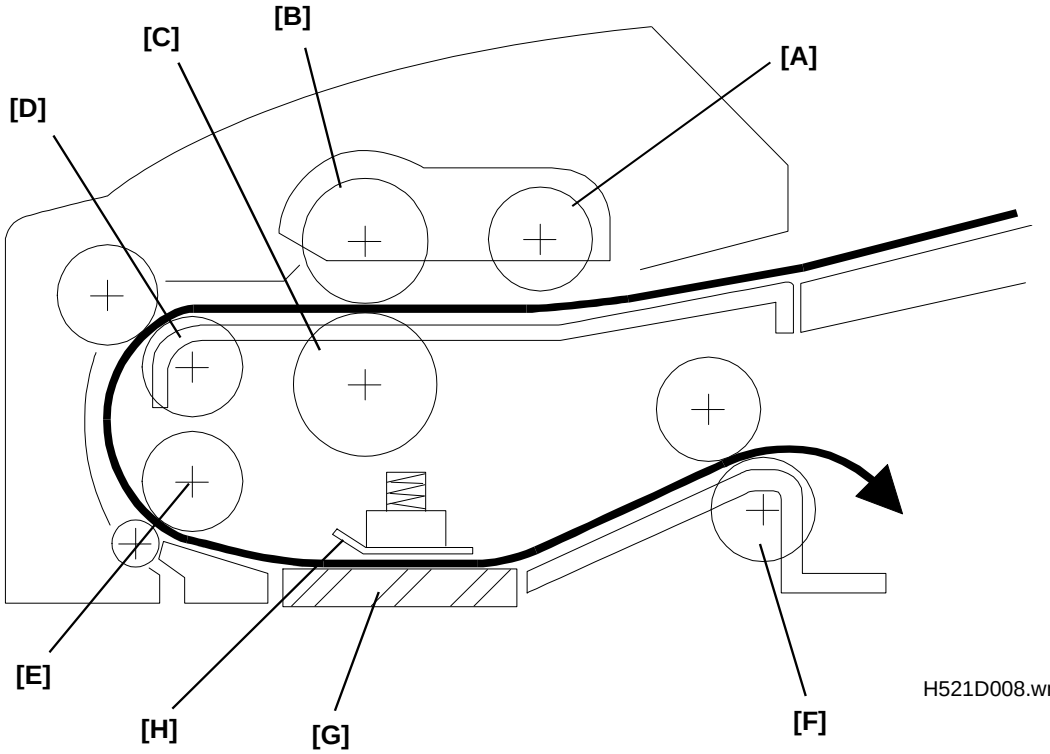
The scanner [B] consists of a contact image sensor and a xenon lamp driver.

The original width sensor [F] and length sensor [G] together detect the size of the original placed on the exposure glass.

The scanner home position sensor [H] allows the scanner return to the same position after scanning.

The platen cover switch [I] detects if the cover is opened or not.

2. ADF



The sheet through type ADF feeds the document from the top page of the document stack on the table.

The pick-up [A] and feed roller [B] feed the original into the scanner, and the separation roller [C] helps to feed one sheet at a time. Then, the R0 [D], R1 [E], and R2 [F] rollers feed the document through the scanner.

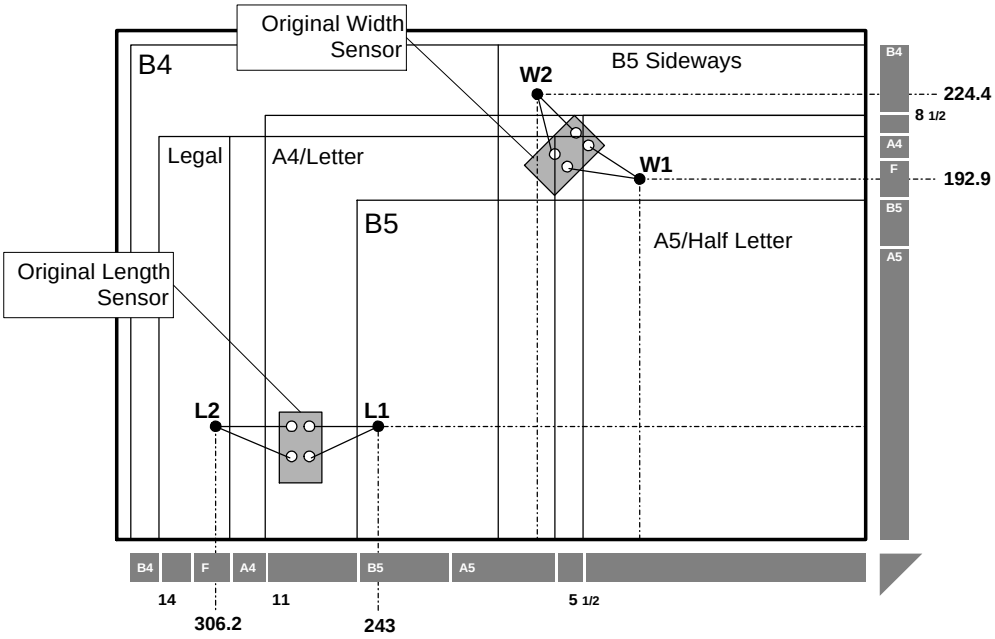
At the time of scanning the document, the scanner ([B] on the previous page) moves down to the scanning position under the exposure glass [G]. The shading plate [H] pushes the document to the exposure glass at the scan line, so that the document is within the image sensor's range of focus.

After scanning, the ADF feeds out the document onto the platen cover, and the scanner moves back to its home position at the right end of the scanner.

Unlike a copier's ADF, this ADF does not have a document length sensor. So, some of the copier features are not available when the ADF is used. Refer to "Original Detection - ADF" later in this chapter.

2.1.2. Original Detection

1. Book Scanner



H521D502.wmf

The original width and length sensors each have two sets of photoemitter and receiver. The actual detection points on the exposure glass are W1, W2, L1 and L2 in the diagram. The cpu continuously checks the sensor outputs when the platen cover is open. The machine uses the paper size detected just before the platen cover is closed (or before pressing the Start key if the platen cover is kept open). The table below shows the paper size detected for each set of sensor outputs, and the data width selected for a fax transmission.

Sensor Outputs				USA	Europe and Asia	Data Width in Fax Tx
W1	W2	L1	L2			
0	0	0	0	B4 Lengthwise	B4 Lengthwise	256 mm
0	1	0	1	Letter Lengthwise (Note 1)	A4 Lengthwise (Note 1)	216 mm
1	1	0	1	B5 Lengthwise	B5 Lengthwise	216 mm
0	0	1	1	B5 Sideways	B5 Sideways	256 mm
0	1	1	1	Half-Letter Sideways (Note 1)	A5 Sideways (Note 1)	216 mm
0	1	0	0	Legal Lengthwise (Note 1)	F/F4 Lengthwise (Note 1)	216 mm
1	1	1	1	Size not detected (Note 2)	A5 Lengthwise or Size not detected (Note 3)	216 mm (US) 216 or 256 mm (Other) (Note 4)

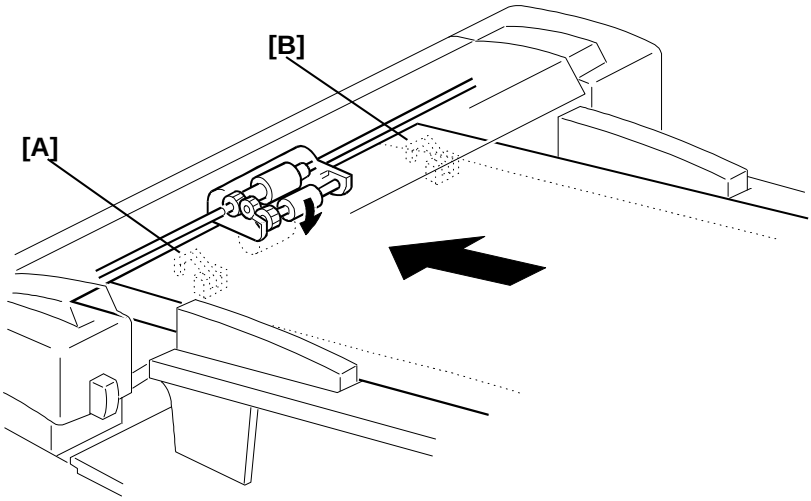
Sensor output: 0 = Original present; 1 = Original not present

Notes

1. The setting of System Switch 0D determines which paper size is detected (USA standard or ISO standard) for each sensor output combination. However, changing a setting will cause some copier functions to not work correctly. (For example, if A4 is selected in the USA model, automatic paper select does not work. This is because A4 size paper is not available for printing with the USA model.)
2. USA: For both Fax and Copier operations, the machine will ask the user to choose a scanning area which is equivalent to Half-letter sideways, Letter, or Legal.
3. If bit 4 of System Switch 0D is 0, the machine uses A5 lengthwise for copier operations (e.g., enlargement to A4 size using a fixed zoom rate). But, in Fax mode, the machine will ask the user to choose a scanning area which is equivalent to an available original size.
   If bit 4 of System Switch 0D is 1, the machine will ask the user to choose a scanning area which is equivalent to an available original size, for both Fax and Copier operations.
4. The following table shows which data width is used depending on what original size the user has selected.

Data Width	Original Size Selected
216 mm	Letter, Legal, Half-letter sideways (US) F/F4, A4, B5 lengthwise, A5 sideways (Europe/Asia)
256 mm	B4, B5 sideways

2. ADF



H521D006.wmf

When using the ADF, the machine can only detect the document width. Unlike a copier's ADF, the machine cannot detect the document length, because there is no length sensor.

As a result, the following copier functions cannot be used when using the ADF, since these functions require the document length before proceeding.

- Automatic paper selection
- Erase border/center

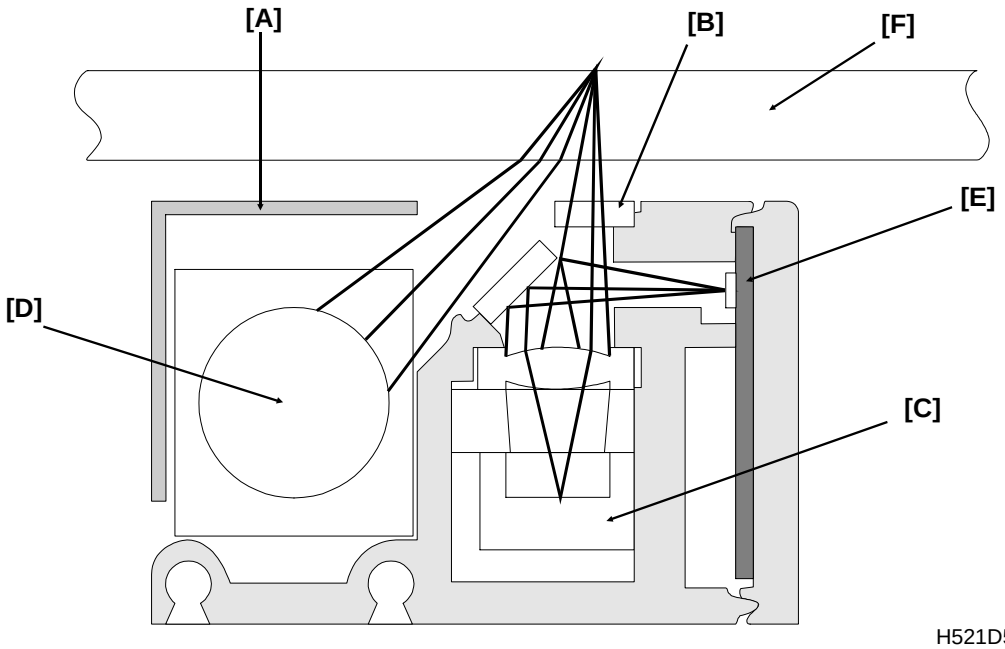
The document sensor [A] and B4 width sensor [B] detect the document width.

- When the document sensor is activated but the B4 width sensor is not, the machine treats the document width as either A4 (210 mm) or Letter/Legal (216 mm).
- When both sensors are activated, the machine treats the document width as B4 (256 mm).

The setting of system switch 0C bit 3 determines whether an International or US paper size is detected.

2.1.3. Scanning

1. Contact Image Sensor



H521D512.wmf

The contact image sensor (CIS) assembly [A] consists of an exposure glass [B], a roof mirror lens array [C], a xenon lamp [D], and an image sensor [E]. The CIS moves under the exposure glass when scanning a book original, or stays at the ADF scan line when scanning a sheet original using the ADF.

The image sensor is a row of 4096 photosensitive elements (B4 width x 16 dots/mm). The roof mirror lens array focuses the light reflected from the document onto the image sensor.

Because of the short optical path inside the CIS, the focal depth is much shorter than for a CCD type scanner. Because of this, two springs at each end of the CIS push it against the exposure glass [F], so that the distance from the original is kept the same all the time. However in book scanning mode, if the original is out of the CIS's focal range, the scanned image may get darker.

Because the analog output signal is a sawtooth waveform, data sampling timing should be adjusted whenever a new CIS is installed in the machine. Refer to section 5.2.1 for more details.

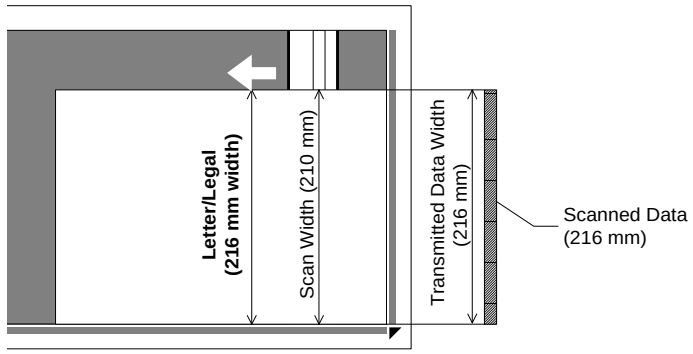
2. Main Scan Resolution and Width (Book Scanner)

Fax Mode

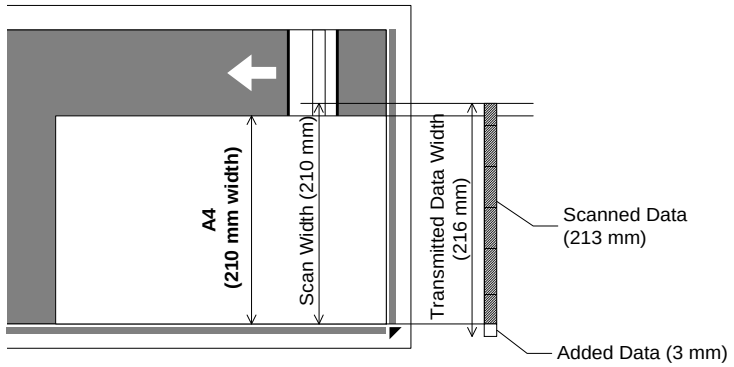
B4 (256 mm/10.1" width) Original
The machine scans 256 mm (10.1") width at 16 dot/mm resolution, then convert it into 8 dots/mm resolution before transmission.

A4 (210 mm/8.3")/ Letter (216 mm/8.5") Original
The machine scans either 216 mm (8.5") or 210 mm (8.3") width at 16 dot/mm resolution, depending on the settings of System Switch 0D bits 0 to 5, then converts the data into 8 dot/mm resolution before transmission. However, the original width of the A4/Letter size specified in the T.30 protocol is 216 mm. So, the following diagrams explain the actual scanned width in each paper size.

Letter size:
The machine scans and transmits the whole width of the original.



A4 size:
The machine scans 213 mm from the front end of the scanning area, and adds 3 mm of white data at the beginning of each line to get a 216 mm width of data for transmission.



H521D503.wmf

Copy Mode

The machine scans 256 mm (B4 width) at 16 dot/mm resolution. Then, each scanned line is stored in the page memory for printing.

3. Main Scan Resolution and Width (ADF)

Fax Mode

- The machine scans either 216 mm (A4/Letter) or 256 mm (B4) at 16 dot/mm resolution, depending on the document width detected. Then each line is converted into 8 dot/mm resolution before transmission.

Copy Mode

- The machine scans the document width at 16 dot/mm resolution.

4. Sub Scan Resolutions and Length (Book Scanner)

Fax Mode

- The machine scans at 15.4 lines/mm, then it converts the resolution before transmission if necessary (refer to “Sub Scan Resolution Conversion” later in this chapter). The scan length is the length of the original detected by the original length sensors (refer to "Original Detection").

Copy Mode

- The machine scans the number of lines required for printing. For example, to print an A4 size copy, 292 x 15.4 lines are scanned (292 mm = A4 length less the top and bottom margins of 2 mm each - the margins are adjustable by RAM address).
  Sub scan resolution depends on the selected reproduction ratio. It is controlled by the motor speed, and not by image processing. At higher motor speeds, more scan lines are omitted, and the effect of this is a lower reproduction ratio. There is a range of resolutions from 2.82 s per A4 page (3.85 lines/mm) for a 50% reproduction ratio up to 11.3 s per page (15.4 lines/mm) for 200%. See "Drive Mechanism" for how the motor speed varies with reproduction ratio.

5. Sub Scan Resolutions and Length (ADF)

Fax Mode

- The machine scans at 15.4 lines/mm, then it converts the resolution for transmission if necessary (refer to “Sub Scan Resolution Conversion” later in this chapter).
  The machine scans the full document length except for the top and bottom margins. However, the length should not exceed the maximum length programmed by Scanner Switch 00, bits 2 and 3.

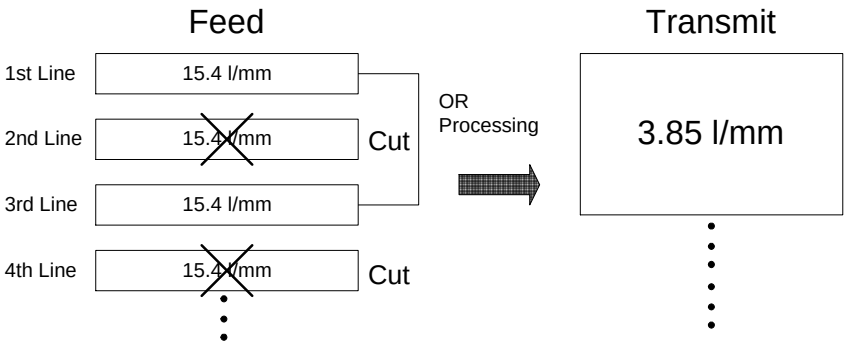
Copy Mode

- See "Sub Scan Resolutions and Length (Book Scanner)" above.
  If the original is longer than the paper length, the excess part is lost.

6. Sub Scan Resolution Conversion

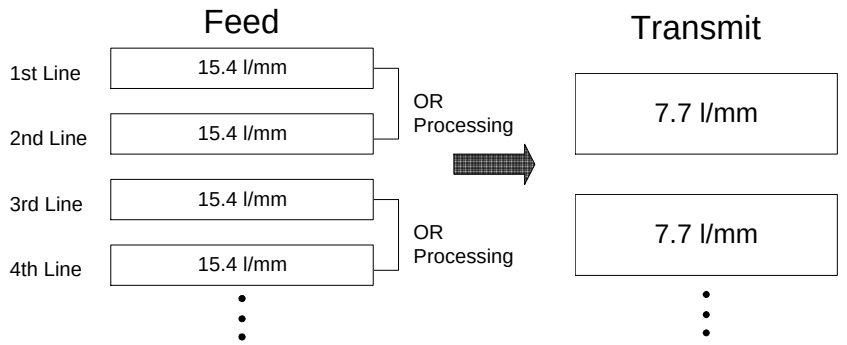
Since the scanner always scans at 15.4 line/mm resolution, sub scan resolution has to be converted when transmitting to a terminal which is not capable of higher resolutions.

Standard: The first and third lines in each four-line group are OR processed for transmission. Other lines are deleted.



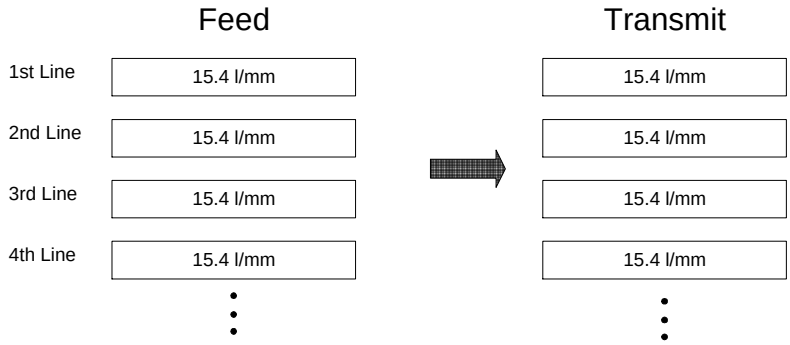
H521D513.wmf

Detail: Pairs of lines are OR processed for transmission.



H521D514.wmf

Fine: All the scanned lines are transmitted.

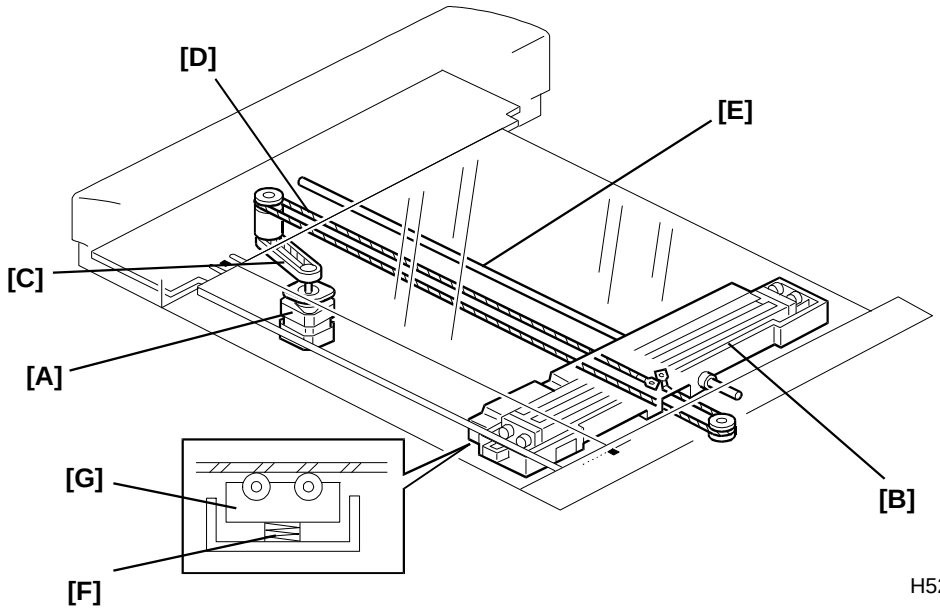


H521D515.wmf

In memory transmission, if the other terminal cannot receive a message at Fine resolution, alternate lines (even-numbered lines) are deleted before transmission.

2.1.4. Drive Mechanism

1. Book Scanner



H521D012.wmf

The book scanner motor [A] drives the scanner [B] through the timing belt [C] and drive wire [D]. The scanner moves along the guide shaft [E].

The spring [F] pushes up the contact image sensor [G] to the exposure glass, so that the distance from the image sensor to the exposure glass surface is constant during scanning.

The motor speed depends on the selected resolution. For reference, the following table shows the speed for scanning an A4 size original.

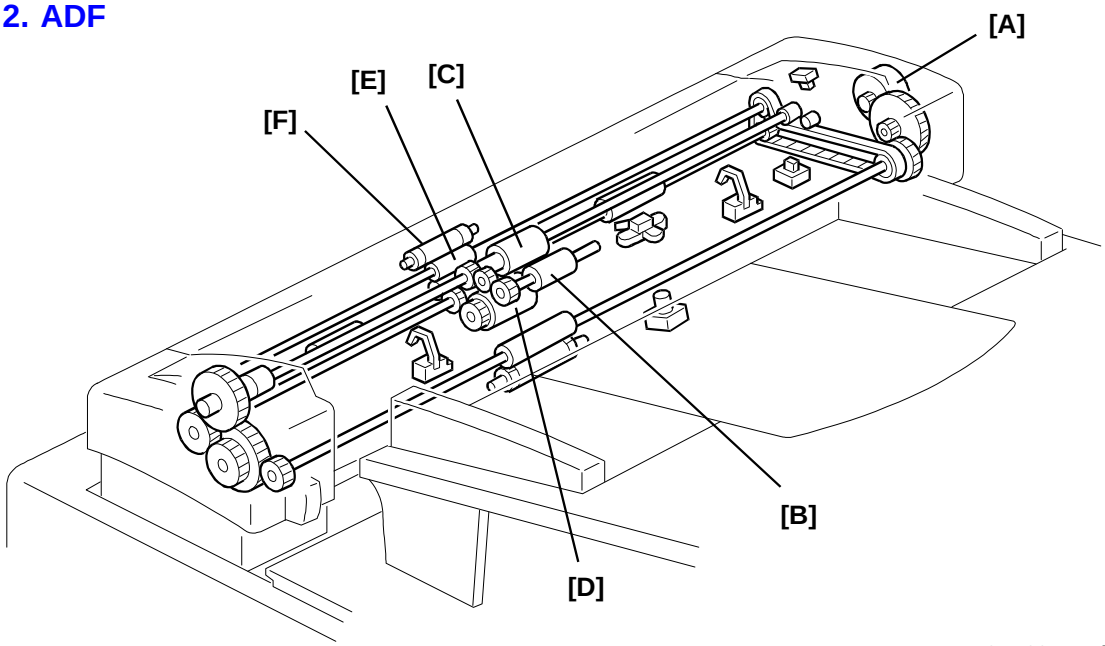
- Fax mode

Standard	5.65 s
Detail	5.65 s
Fine	11.30 s

- Copy Mode

Reduction	Scan Speed (/A4)	Full Size and Enlargement	Scan speed (/A4)
50 % reduction	2.82 s	Full size	5.65 s
65 % reduction	3.67 s	115 %	6.50 s
71 % reduction	4.01 s	121 %	6.84 s
74 % reduction	4.18 s	122 %	6.89 s
77 % reduction	4.35 s	141 %	7.97 s
82 % reduction	4.63 s	155 %	8.76 s
87 % reduction	4.91 s	200 %	11.30 s
93 % reduction	5.25 s		

2. ADF



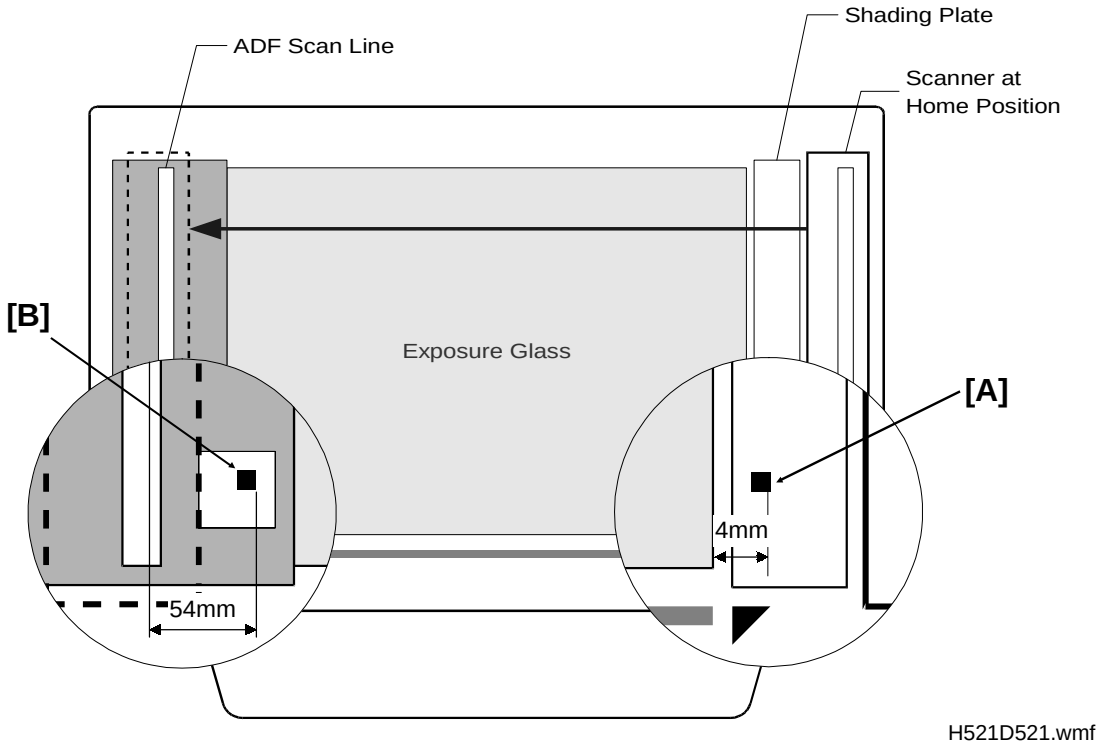
H521D005.wmf

The ADF motor [A] drives the pick-up roller [B], the feed roller [C], the R0 roller [D], the R1 roller [E], and the R2 roller [F].

The motor speed varies in the same way that the book scanner motor does (see the previous page).

Cross reference
Maximum document length: Scanner Switch 00, bits 2 and 3.

3. Scanner Position Fine Adjustment



Two square black marks [A] and [B] (2 x 2 mm) are used to move the scanner to the exact scan start position. At the start of scanning, the scanner moves from the scanner home position, and looks for the appropriate mark, which depends on the scanning mode (book or ADF). The machine uses the black mark to move to the exact scan start position, which is nearby.

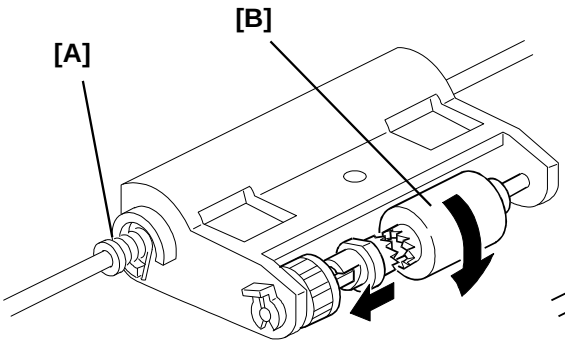
- Book Scanner
  When the machine detects the right edge of the black mark [A], it moves another 4 mm to the scan start position.

- ADF
  When the machine detects the right edge of the black mark [B], it moves another 54 mm to the scan start position.

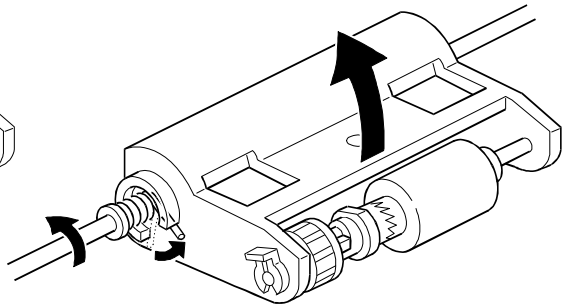
If the black mark cannot be found, scanning continues, but error code 1-09 is generated and stored in the error code memory area.

Cross-reference
Image Adjustment: Section 5.11

2.1.5. Pick-up and Feed (ADF)



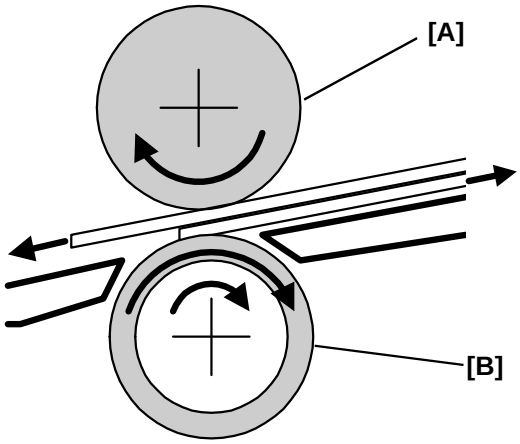
H521D007.wmf

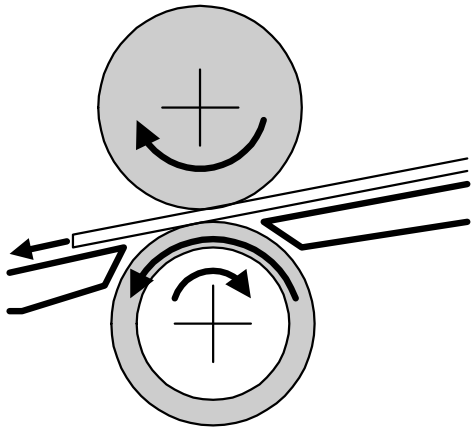


H521D009.wmf

When the ADF motor starts, the mechanical clutch [A] moves the pick-up roller [B] down to the document. Then, the machine feeds the top page of the document. After the last page is scanned, the ADF motor reverses briefly to move the pick-up roller back to the standby position.

2.1.6. Separation Mechanism (ADF)





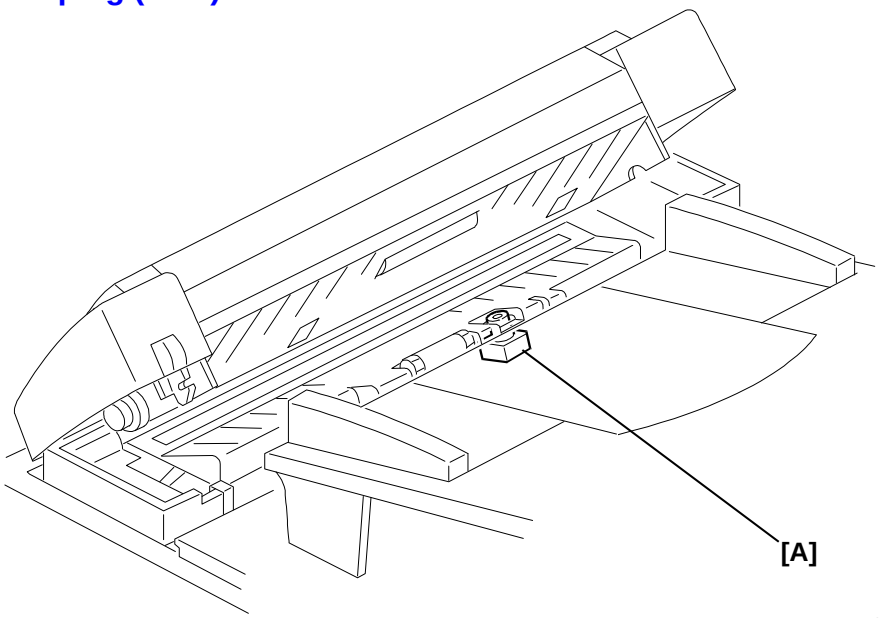
H521D511.wmf

The feed roller [A] and the separation roller [B] prevent more than one sheet of paper from feeding into the scanner at once.

When the feed roller feeds a sheet of paper, both the feed and the separation rollers rotate in the feed-in direction. However, if two or more sheets are between these rollers, the separation roller rotates in the feed-out direction to prevent the lower sheet from being fed into the scanner.

Cross reference
Separation mechanism: Group 3 Facsimile Manual, page 2-2-14.

2.1.7. Stamping (ADF)



H521D010.wmf

The machine always stops feeding at the stamping position.

If the Stamp LED is turned on, the machine activates the stamper solenoid [A] for 500 ms after the page was transmitted (immediate transmission) or stored (memory transmission) successfully. Then the page is fed out of the scanner.

If the Stamp LED is turned off, the machine feeds out the page without stamping.

2.1.8. Error Conditions

1. Book Scanner

The main cpu detects an error if one of the following conditions occurs.

Condition	Description	Error Code
Black mark not detected	The scanner did not detect the black mark at scanning start position correction. The machine does not stop scanning even if this error was detected.	1-09
Incorrect home position sensor condition	The scanner home position sensor did not turn on after the motor moved 480 mm back to the home position after scanning.	9-11
	The scanner home position sensor stayed on after the motor moved 20 mm from the home position at the start of scanning.	
	The scanner could not go to the home position at power on.	
Cover open	While the machine is working, the printer cover is open and the interlock switches turn off.	No error code

2. ADF

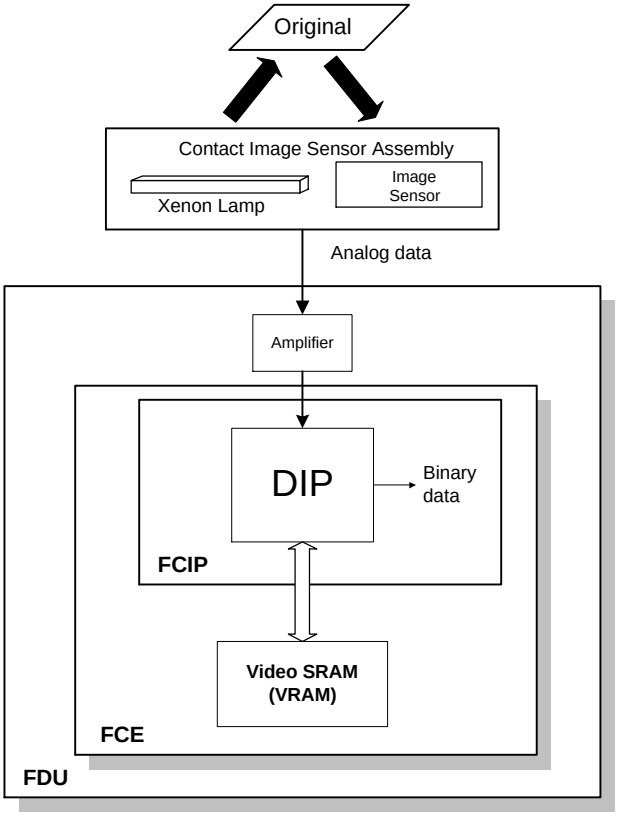
The main cpu detects an error if one of the following conditions occurs.

Jam Condition	Description	Error Code
Non-feed	The scan line sensor does not switch on within 3.7 s of the ADF motor starting.	1-00
Incorrect sensor conditions	The scan line sensor switches on while the document sensor is off.	
	The document width sensor switches on while the document sensor is off.	
	The scanner home position sensor did not turn on after the motor moved 480 mm back to the home position after scanning using ADF.	9-11
Maximum document length exceeded	The scan line sensor does not turn off after the maximum document length has been fed since it turned on; this is after 23 s at standard and detail resolution, or 46 s at fine resolution (these times are for a 1.2 m long document).	1-01
Black mark not detected	The scanner does not detect the black mark at scanning start position correction. A document jam is not detected for this error code, and scanning continues as normal.	1-09

Jam Condition	Description	Error Code
Error during feed-out	When the final page of the document has been fed out of the scanner, or when a jammed document has been removed, the ADF motor reverses. The error occurs if a document is placed into the feeder while the motor is rotating.	No error code
Cover open	While the machine is working, the ADF cover and/or printer cover are open.	No error code

2.1.9. Video Processing

1. Analog Signal Processing

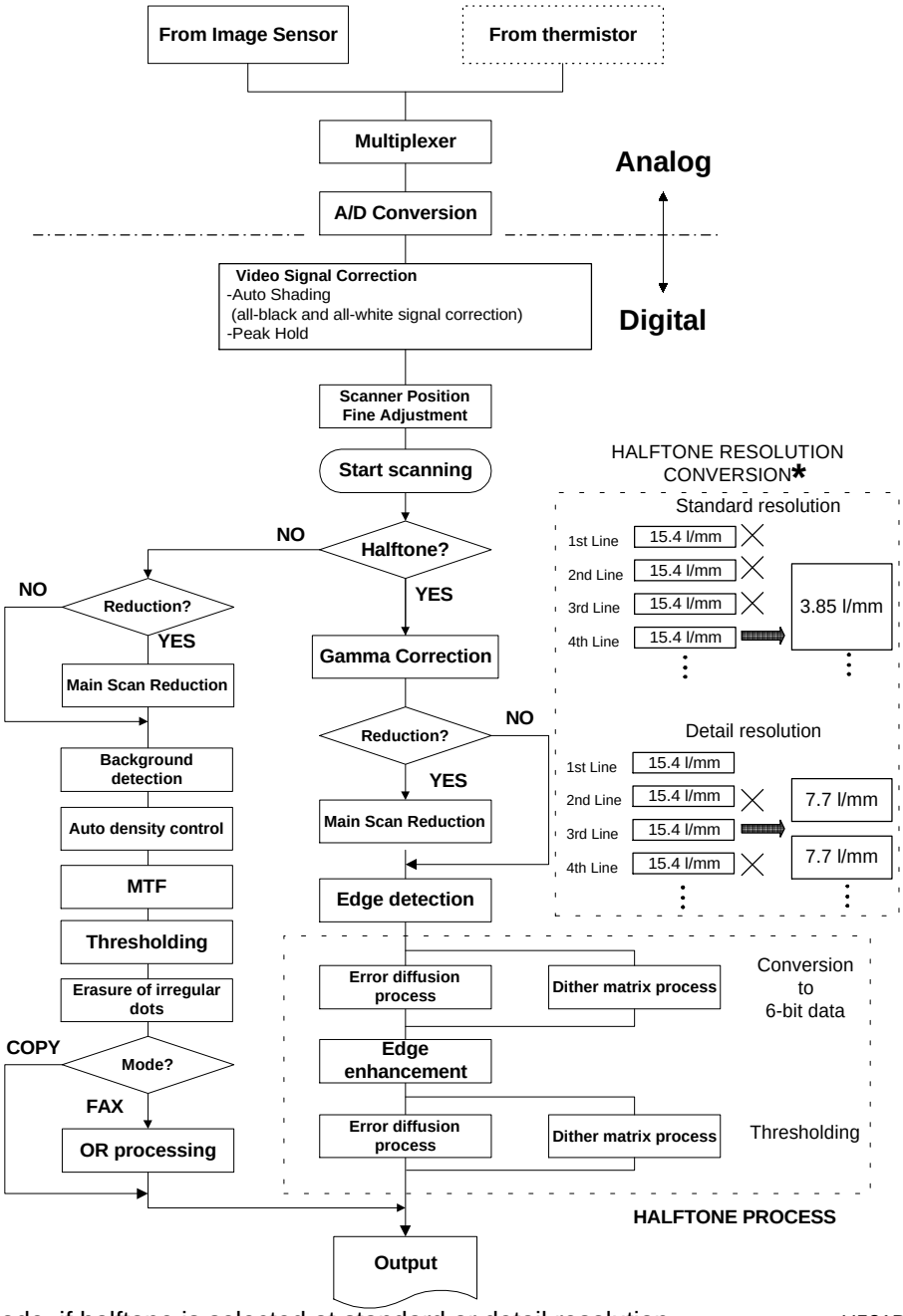


H521D519.wmf

The analog video signal from the contact image sensor assembly is amplified in the FDU, then transferred to the DIP (Digital Image Processor) inside the FCIP.

2. Digital Video Processing Steps

Overview



H521D520.wmf

* In fax mode, if halftone is selected at standard or detail resolution, sub scan resolution is converted as shown in the diagram, before any digital image processing is done.

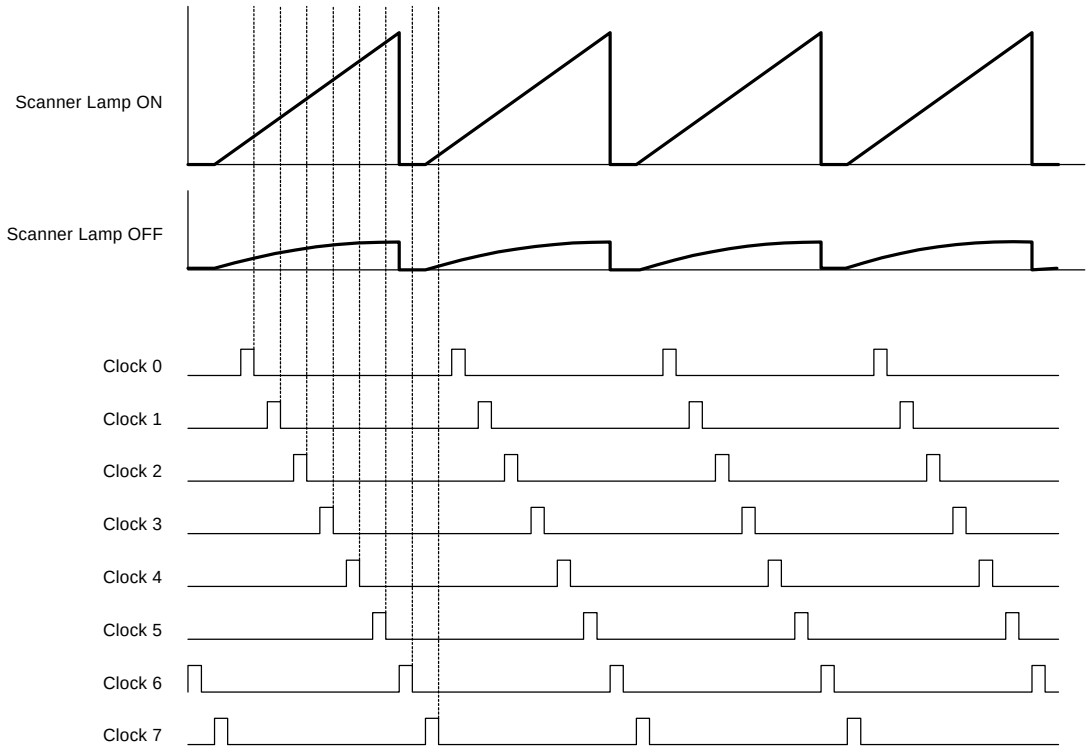
The analog signal from the CIS is first converted into an 8-bit digital signal. Then it passes through some digital processes that depend on the selected scanning modes. To process the data, the DIP uses a dedicated 8 kb video SRAM (VRAM).

Details

Cross-reference
Group 3 Facsimile Manual: section 2-3

The DIP carries out the following image processing on the data (refer to the flow chart on the previous page).

Sampling Clock Selection



H521D510.wmf

The image sensor output is a sawtooth waveform. So the sensor output level depends on the sampling clock selected as shown in the above diagram.

The clock is adjusted at the factory. But in the field, the clock should be reset using service function 10-4 whenever the image sensor is replaced. Refer to section 4.1.19 for the procedure.

Preliminary Processing

1. A/D conversion
   - The multiplexer selects the data from the image sensor, then the DIP converts this to an 8- bit digital signal.

2. Video signal correction
   - The image sensor corrects for the gound level and amplification ratio by itself.
   - The machine reads all-black and all-white waveforms before the scanner moves to scan the document.
     First, the image sensor reads the white plate that is behind the exposure glass, with the lamp off. The machine stores the output data in the VRAM (this is the all-black waveform). The image sensor then reads the white plate with the lamp on, and the machine stores this data (this is the all-white waveform).
     Then, the machine starts scanning the document. The data output from each element on the image sensor is compared with the above stored values, and corrected (this is Auto shading).
   - The all-white waveform is also used as a peak level for the peak hold function.

If Halftone was not selected

1. Background detection
   - Each pixel is tested in relation to its neighbours to determine if it is background noise and should be eliminated.

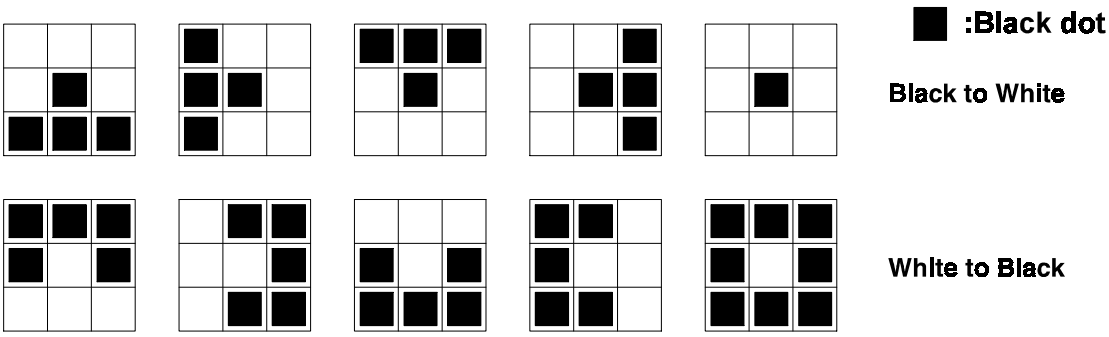
2. Auto density control
   - The most suitable threshold value is calculated from the density that is detected from a fixed area on each original.

3. MTF

MTF (Modulation Transfer Function) can reproduce details such as thin lines, points, and complex characters.

4. Thresholding
   - Each video data element is compared against the threshold level, which depends on the contrast selected by the user. If an element is lighter than the threshold level, it is converted to a white (0). Otherwise, it becomes a black (1).

5. Erasure of irregular dots



H521D522.wmf

- If an element after being converted to white or black by the above thresholding is irregular against the surrounded pixels, it is output in the opposite color. The central pixel is compared with the surrounding eight pixels to determine whether this process is necessary. There are ten cases, as shown below, in which conversion is done. This results in a noise-free and clean image.

5. OR processing
   - When the user selects a resolution that is less than the resolution used by the scanner, the DIP will either do OR processing and/or skip alternate lines of data to convert the scanned resolution into the resolution required for transmission. (See "Sub Scan Resolution Conversion" in section 2-1-1.)

If Halftone was selected

1. Gamma correction
   - Gamma correction corrects the response of the image sensor to the various shades in the gray scale from black to white.

2. Edge detection
   - Edge detection preserves the sharpness of image outlines. Each element is tested to determine whether it is on a boundary of two areas of sharp contrast.

3. Halftone process

- The data is converted to six-bit (0 - 63) for halftone processing. In addition, if error diffusion was selected, each element is corrected using the differences between it and the surrounding elements. This process reduces the differences in contrast between light and dark areas of a halftone image.
- Edge enhancement is done - As a result of the edge detection, if the element is on a boundary, the element goes directly to white or black, without thresholding (see below).
- The data is thresholded. Each pixel is compared with the corresponding element in a dither matrix or using error diffusion. The resulting data is one-bit (0 or 1).

3. Video Processing Parameters

Some of the parameters used for digital image processing can be changed by RAM addresses. See section 5-11-4 for details.

1. Contrast

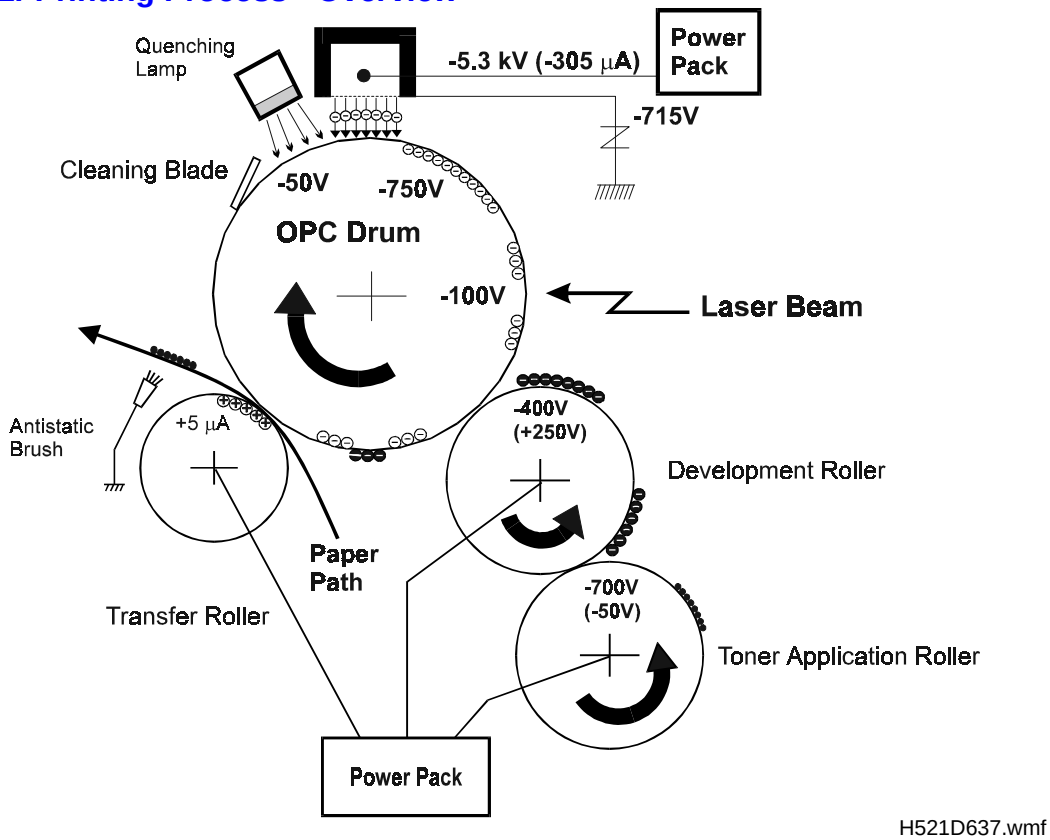
RAM addresses 8003FD to 80040E

2. Image processing parameters

RAM addresses 80040F to 800426

2.2. PRINTING

2.2.1. Printing Process - Overview

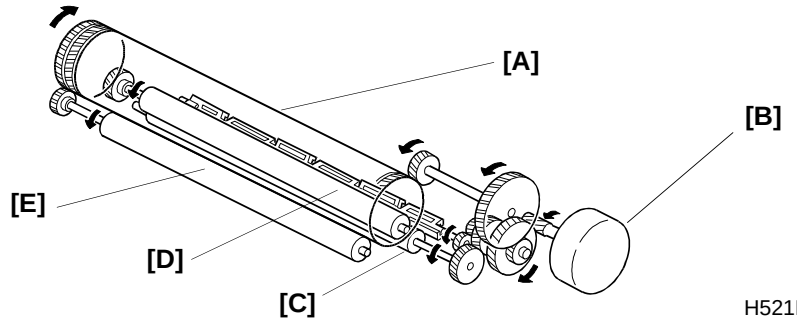


H521D637.wmf

This machine uses a "write to black" system, using negative toner.

- The charge corona wire gives the drum surface a negative charge of -750 V.
- The exposed area on the drum drops to about -100 V.
- The development roller carries toner to the latent image on the drum surface.
  Development bias (during printing):
  Toner application roller : -700 V
  Development roller: -400 V
  Switching bias:
  Toner application roller : -50 V
  Development roller: +250 V
- The transfer roller pulls the toner from the drum onto the paper.
  A constant current of +5 µA is applied. The antistatic brush helps to separate the paper from the drum.
- The cleaning blade removes any toner remaining on the drum after the image is transferred to the paper.
- The quenching lamp reduces the negative charge on the drum to about -50 V.

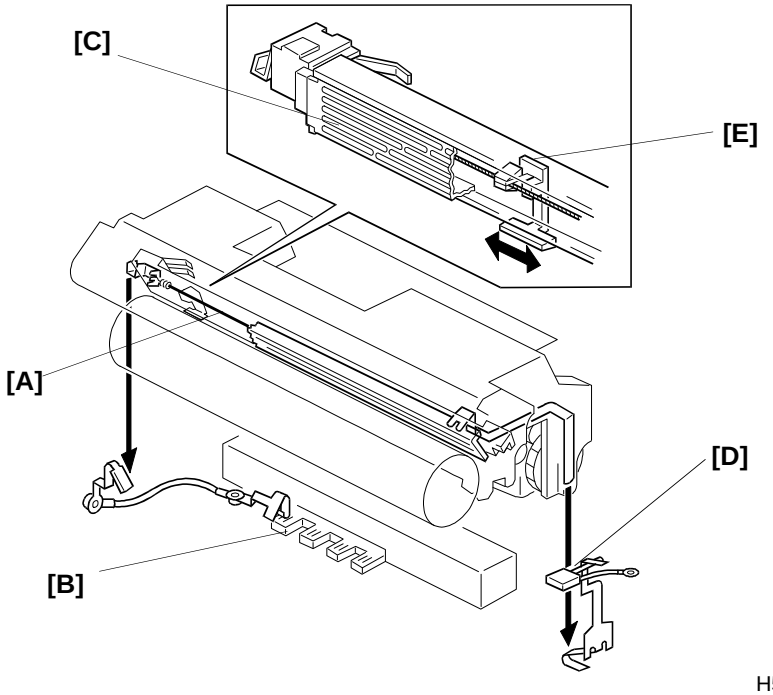
2.2.2. OPC Drum



H521D604.wmf

An organic photoconductor drum [A] is used in this machine. The diameter of the drum is 30 mm. It is driven by the main motor [B] through a gear train. The toner application roller [C], development roller [D], and transfer roller [E] are also driven by the same gear train. The drum unit is replaceable by the customer.

2.2.3. Charge



H521D605.wmf

The CTM contains a charge corona unit. The corona wire [A] generates -ve ions when the power pack [B] applies a constant current of -305 ± 5 µA (the voltage is about -5.3 kV) . The grid plate [C] ensures that the charge is uniformly spread out. The zener diode [D] ensures that the charge on the drum does not exceed -750 ± 50 V.

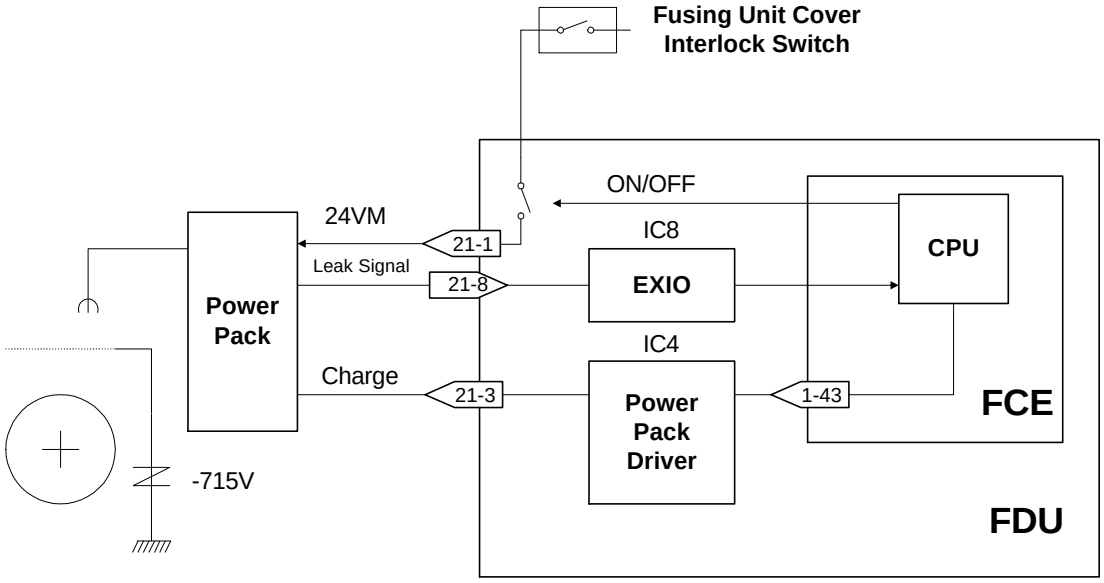
The charge corona unit contains a wire cleaner [E] for user maintenanace.

The ozone fan on the left hand side of the machine provides air flow to the charge corona unit, and the ozone filter (a paper filter coated with carbon) decomposes the ozone generated around the drum by the corona discharge.

Charger Leak Detection:

The machine detects a charger leak error when the FDU CN21-8 stays low for 3 seconds or more (6 seconds or more at power on) either while in standby mode or while the corona wire is being charged. When this occurs, the machine warns the customer by lighting the Call Service indicator (error code 9-17).

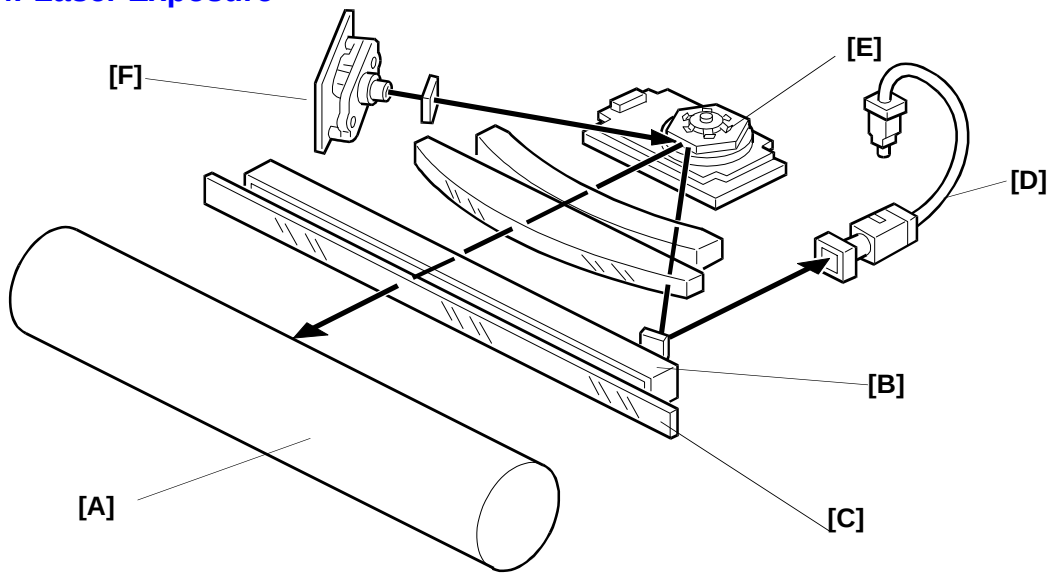
Charge Control



H521D657.wmf

In this machine, a higher corona wire current is used to counter black bands on copies. The charge on the drum exceeds the zener diode voltage as a result of this higher current.

2.2.4. Laser Exposure



H521D606.wmf

1. Overview

The components of the laser section are the same as those described in the section 4-3-3 of the Group 3 Facsimile manual. The drum [A] is positioned in the same plane as the laser unit, so there is no mirror to change the optical path.

Points to note:

- The focusing lens [B] is a barrel toroidal lens.
- The shield glass [C] prevents toner and dust from entering the laser optics area.
- An optical fiber [D] passes the reflected laser beam to the laser sychronization detector circuit in the FDU.
- The shape of the mirror [E] is hexagonal.
- The strength of the beam emitted from the LD unit [F] is 5 mW at a wavelength of 780 nm.
- The dimensions of the dot on the drum are 85 µm by 85 µm.

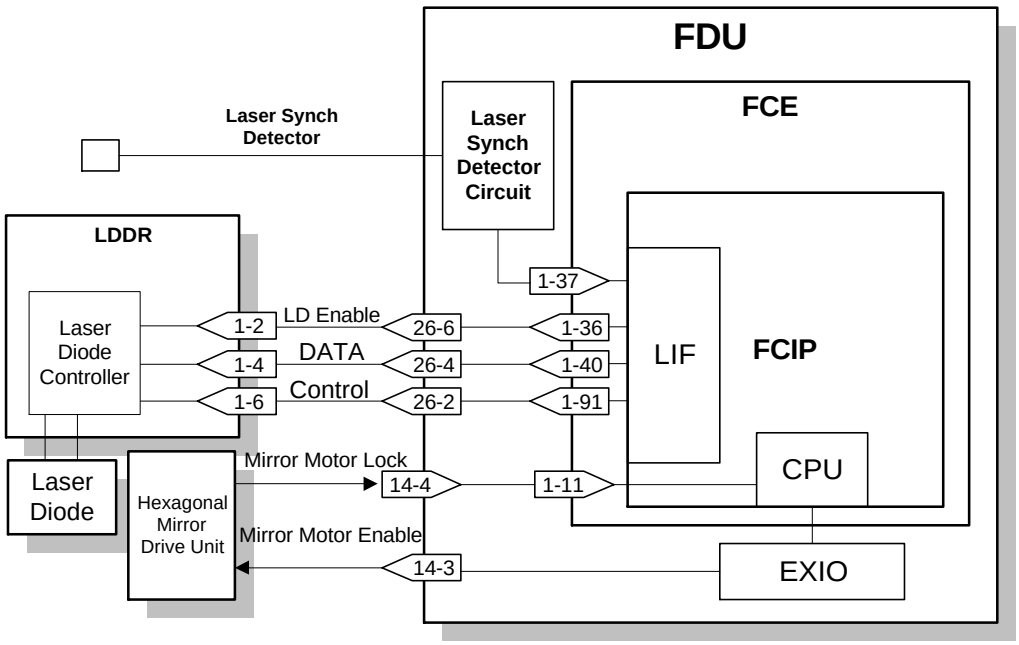
The hexagonal mirror motor speed depends on the printing resolution:

- Copy and G3 l/mm mode (16 x 15.4 dots/mm): 10402 rpm
- Printer mode (300 dpi): 7977.8 rpm

The charge on the exposed section of the drum drops to about -100 V while non-exposed areas it remains at about -750 V.

Cross-reference
Group 3 Facsimile Manual: section 4-3-3

2. Block Diagram



H521D648.wmf

The LIF block in the FCIP monitors and controls the laser diode power (FDU CN26-2) and transfers data for printing to the laser diode (FDU CN26-4).

Cross-reference
Group 3 Facsimile Manual: page 4-3-13

3. Error Conditions

LD Failure Detection:
The machine detects LD failure when the Laser Synchronization signal is not detected within 10 ms of the LD ready signal. When this occurs, the machine warns the customer with the Call Service indicator (error code 9-20).

Mirror Motor Error:
The machine detects a mirror motor error when FDU CN14-4 does not go low within 10 seconds of the hexagonal mirror motor being turned on.
The machine also detects a mirror motor error when FDU CN14-4 goes back to high for 3 seconds or more during mirror motor operation. When either of these errors occurs, the machine warns the customer with the Call Service indicator (error code 9-23).

4. Print Density Adjustment

The FCIP controls print image density by changing the laser pulse width to adjust the width of the dots across the page. The beam strength is not adjusted in this model.

The following table shows the relationship between the pulse width and the image density.

Mode			Image Density		
			Normal	Lighten	Darken
Copy Mode	Normal		80 %	40 %	160 %
	Halftone		80 %	40 %	160 %
Enlarge in Copying	115 %	Normal	100 %	40 %	160 %
		Halftone	80 %	40 %	160%
	122 %	Normal	100 %	50 %	150 %
		Halftone	83 %	50 %	150 %
	141 %	Normal	100 %	43 %	157 %
		Halftone	86 %	43 %	157 %
	200 %	Normal	100 %	40 %	160 %
		Halftone	80 %	40 %	160 %
Fax Mode	Normal		100 %	40 %	160 %
	Halftone		20 %	20 %	100 %

To change the pulse width, the duty cycle of the laser pulse is changed. For example, to make the print density 40% of normal, the laser is only kept on for 40% of the normal duration for each pixel.

5. Enlargement

For enlargement, the FCIP controls the magnification ratio by changing the interval between pulses in the laser clock signals. So, for example, the clock signal pulse interval for 200% enlargement is twice as long as the interval for normal (100%) image reproduction. This makes each image pixel for 200% enlargement become twice as long as each pixel for normal image reproduction.

During copying, a main scan resolution of 16 dots/mm is used, and smoothing is not done on images of this resolution. In enlargement, since each pixel is enlarged, video processing such as smoothing cannot be done.

6. Toner Saving Mode

In this machine, toner saving is done by reducing the number of dots actually printed, not by varying the development bias. In toner saving mode, the image data is filtered through the following four-line matrix.

```
1st line          1 0 1 0 1 0 1 0 1 0 . . . . .
2nd line          0 0 0 0 0 0 0 0 0 0 . . . . .
3rd line          0 1 0 1 0 1 0 1 0 1 . . . . .
4th line          0 0 0 0 0 0 0 0 0 0 . . . . .
```

(1: Actual data printed, black or white; 0: Always a white pixel)

Notes:

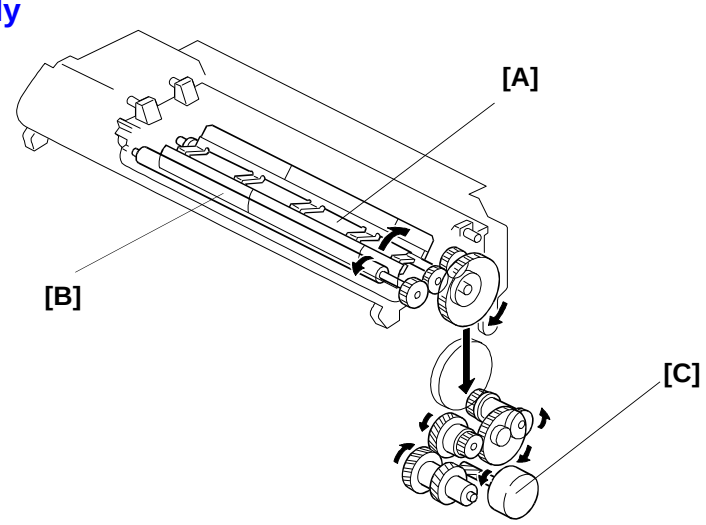
- Toner saving mode only works when printing fax messages and reports. (However, toner saving is disabled in NSF/NSS halftone mode, that is, when bit 126 of the NSF/NSS frame is set to 1.)
- When toner saving mode is selected, the print image density is automatically set to "Normal"; in some cases, the image may become invisible if the Lighter setting is used.

Cross Reference
Toner Saving Mode: User parameter 12, bit 2

Edge Enhancement

In toner saving mode, the machine prints a black pixel whenever the data changes from white to black in the main scan direction. In this way, edges on the image are printed more clearly.

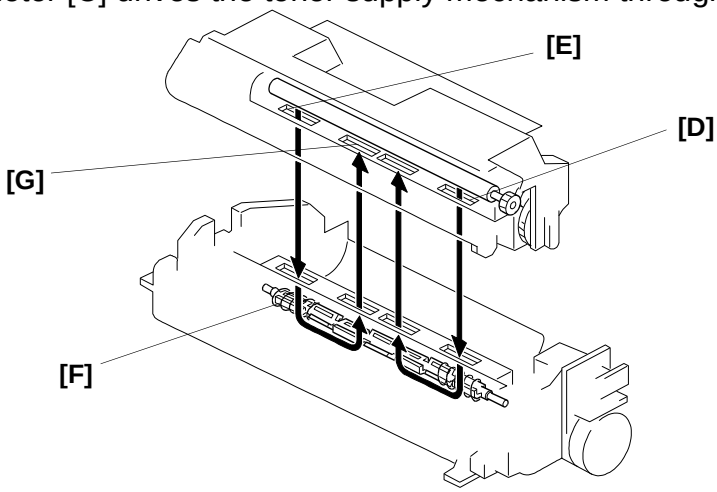
2.2.5. Toner Supply



H521D617.wmf

This machine uses monocomponent toner, which is composed of resin and ferrite. The toner mixing bar [A] stirs and carries toner to the toner supply roller [B]. The toner supply roller supplies toner to the development unit.

The main motor [C] drives the toner supply mechanism through a gear train.



H521D649.wmf

Toner is supplied to the development unit from the outer openings [D, E] of the CTM. The spiral mechanism [F] on the toner supply bar distributes toner through the development unit.

Openings in the central area of the CTM [G] allow toner to circulate upwards from the development unit. This circulation prevents excessive toner supply to the development unit and ensures that the toner remains fresh (this helps to prevent blurred images).

Initial Toner Supply Mode

When the first CTM is installed in a new machine, the machine automatically supplies toner to the development unit for 90 seconds. This will also be done automatically after a RAM reset level 1 or 2 is performed.

Initial toner supply mode must also be executed by a technician when the development unit is replaced.

Cross-reference
Initial toner supply mode: RAM address 8003C1 (See sections 4-5 and 5-4-5 for details)

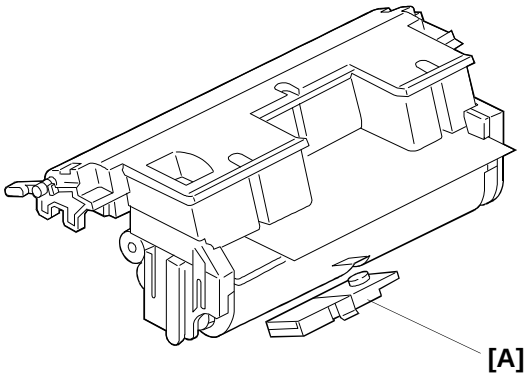
CTM Detection

At the following times, the machine detects whether a CTM is installed by checking the power supply to the quenching lamp (this is part of the CTM).

- At power-up.
- When the machine comes back to normal mode from the Level 2 Power Saver Mode.
- When the cover is opened and then closed.

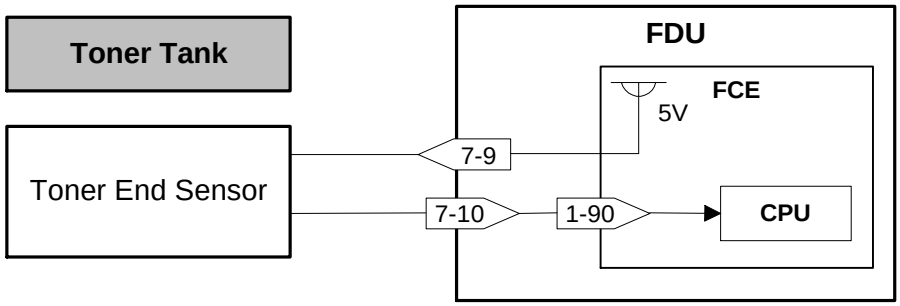
The machine disables all printing processes if a CTM is not installed.

Toner End Detection



H521D624.wmf

Toner near-end is detected by the toner end sensor [A], which is located below the toner tank.



H521D660.wmf

While the main motor is rotating, the machine detects toner end by the voltage output from the toner end sensor . The voltage from the sensor is close to 5 V when the toner tank is full and becomes low when toner is almost empty.

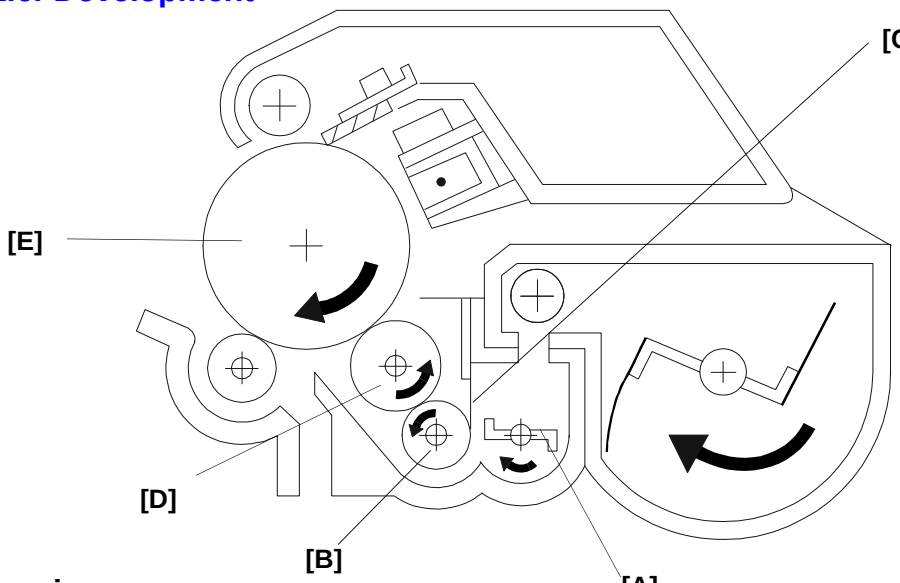
Toner near-end condition: When the cpu detects a low output from the toner end sensor for more than 30 s, the cpu starts to blink the Add Toner indicator. This is the toner near-end condition.

Toner end condition: After toner near-end is detected, the machine can print 100 more sheets, then the cpu disables printing (this is the toner end condition).

The machine clears the toner near-end or toner end condition when the power is switched off and back on or when the cover is opened and closed, if the output from the toner end sensor goes back high again.

However, when the machine is turned off/on or when the cover is opened and then closed, the machine requires about 30 s to check for a toner near-end condition again. So, if the user prints something within this 30 s period without changing the CTM, the machine will allow the printout to be made, but the print quality may be poor.

2.2.6. Development



H521D616.wmf

Overview

There are two development rollers in the development unit: the Toner Application Roller and the Development Roller.

The toner supply bar [A] stirs and carries toner to the toner application roller [B]. Toner is attracted to the toner application roller because it has a magnetic layer. As the toner application roller turns past the toner metering blade [C], only a thin coating of negatively charged toner particles stays adhered. (Refer to section 4-4-2 of the Group 3 Facsimile manual.)

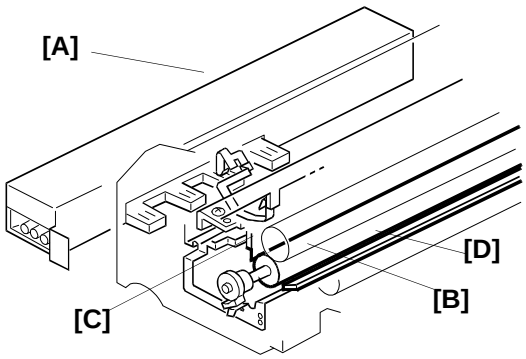
During printing, a bias voltage of -700 V is applied to the toner application roller and another bias voltage of -400 V is applied to the development roller. The toner is carried from the toner application roller to the development roller [D] by the potential difference between these two rollers.

The exposed area on the drum [E] is at -100 V. The development roller applies toner to these areas of the latent image as they turn past the drum.

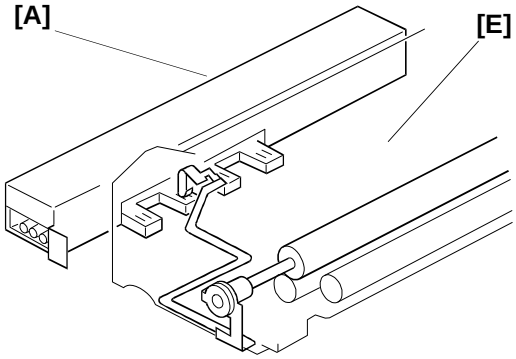
The development roller is made of a soft rubber so it does not damage the surface of the drum. The development roller is provided as a separate spare part because it always contacts the toner application roller, and so may become dented.

The speed ratio between the drum, development roller, and the toner application roller is about 1 : 1 : 3. The toner application roller rotates three times as fast as the development roller, so it deposits a layer of toner three times as thick on the development roller. This leads to a clearer image. Also, the toner application roller rotates in the opposite direction to the development roller, which helps to keep the toner level on the development roller.

Development Bias



H521D618.wmf

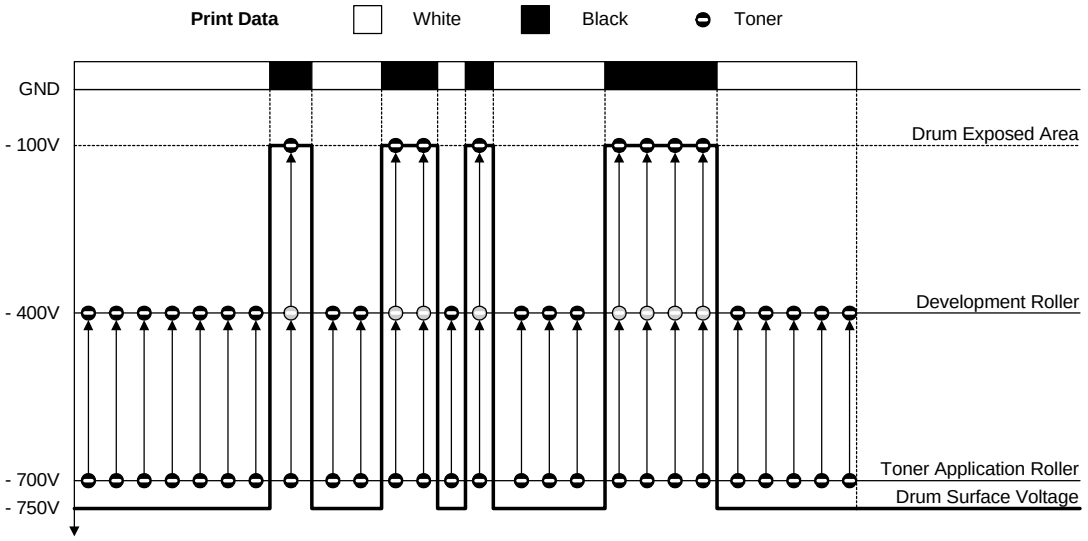


H521D619.wmf

The power pack [A] applies one bias voltage to the toner application roller [B], toner metering blade [C], and bias brush [D], and a different voltage to the development roller [E].

Bias Control (During Printing)

A charge of -700 ± 40 V is applied to the toner application roller, and -400 ±10 V is applied to the development roller. Toner transfers from the toner application roller to the development roller and on to the laser-exposed areas drum as shown below.



H521D655.wmf

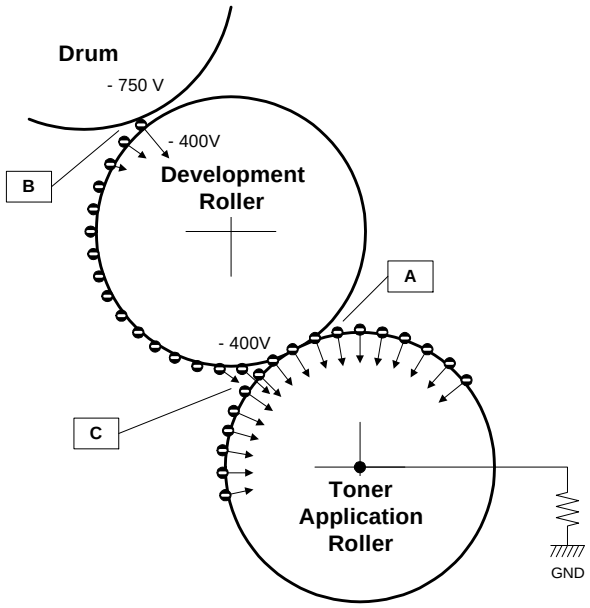
Bias Control (After Each Page)

After each page, the machine removes toner from the development roller and returns it to the development unit. To do this, -400V is applied to the development roller, but no bias is applied to the toner application roller.

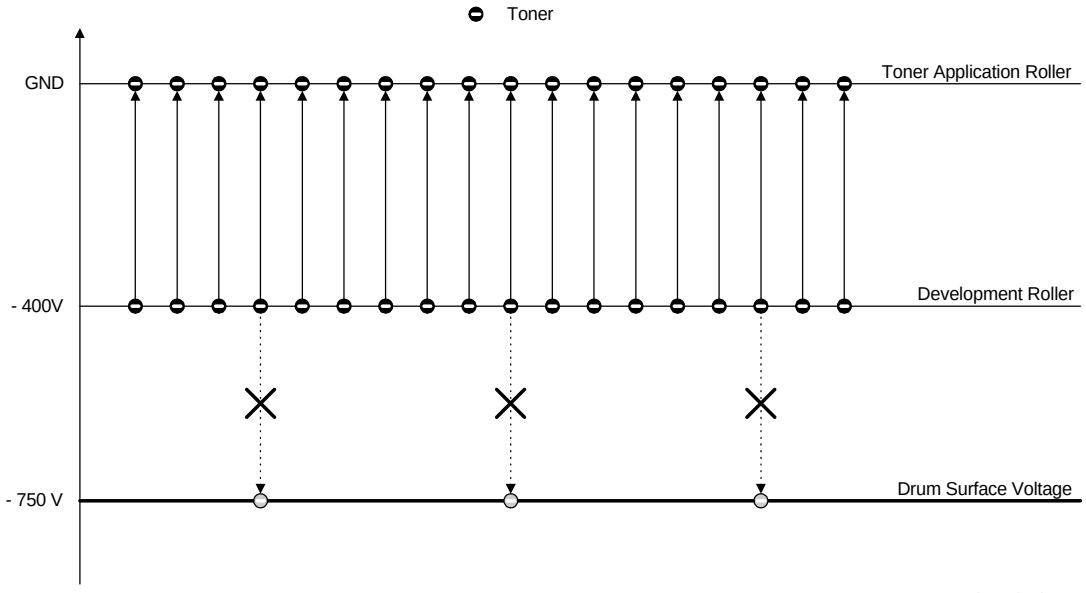
Toner does not transfer to the development roller at "A", but remains on the toner application roller when it passes between the two rollers.

The remaining toner on the develpment roller does not transfer to the drum at "B", but transfers to the toner application roller at "C".

In some cases, positively charged toner may transfer to the drum in this condition. So, a positive current is applied to the transfer roller after each page, so that the positively charged toner does not transfer to the transfer roller.



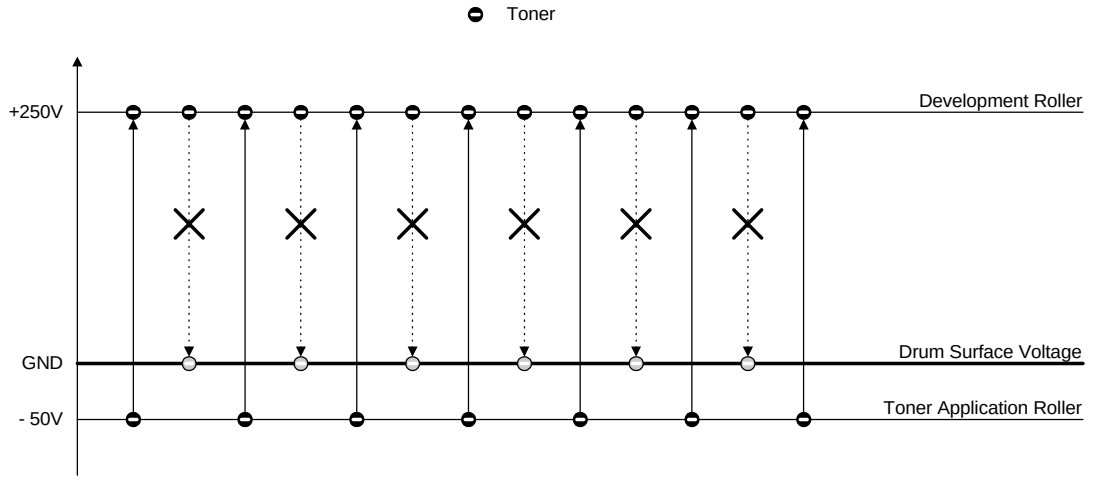
H521D651.wmf



H521D656.wmf

Bias Control (Other)

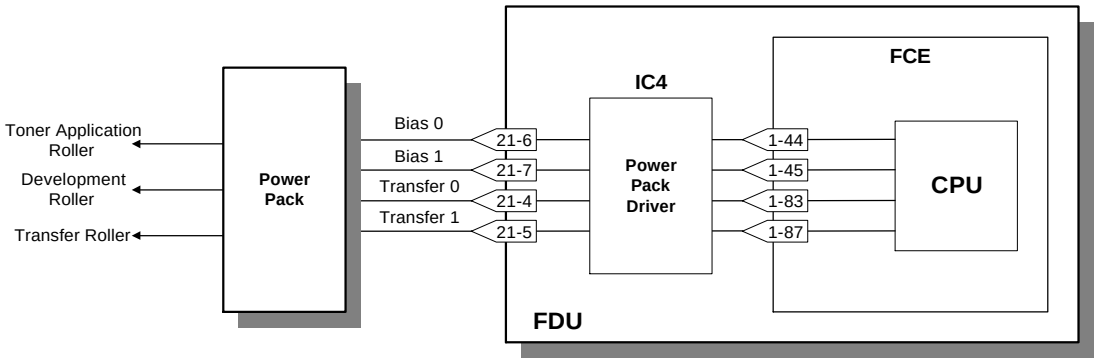
At the start and the end of any print process (including the cleaning and initial toner supply modes), -50 ± 50 V is applied to the toner application roller, and +250 ± 15 V is applied to the development roller. This is to avoid any toner transfer to the drum.



h521d650.wmf

Note that the voltage difference between the toner application and development rollers is kept the same as in printing, at 300 V. This keeps the same amount of toner on the development roller at all times during the print run.

Bias Control Circuit



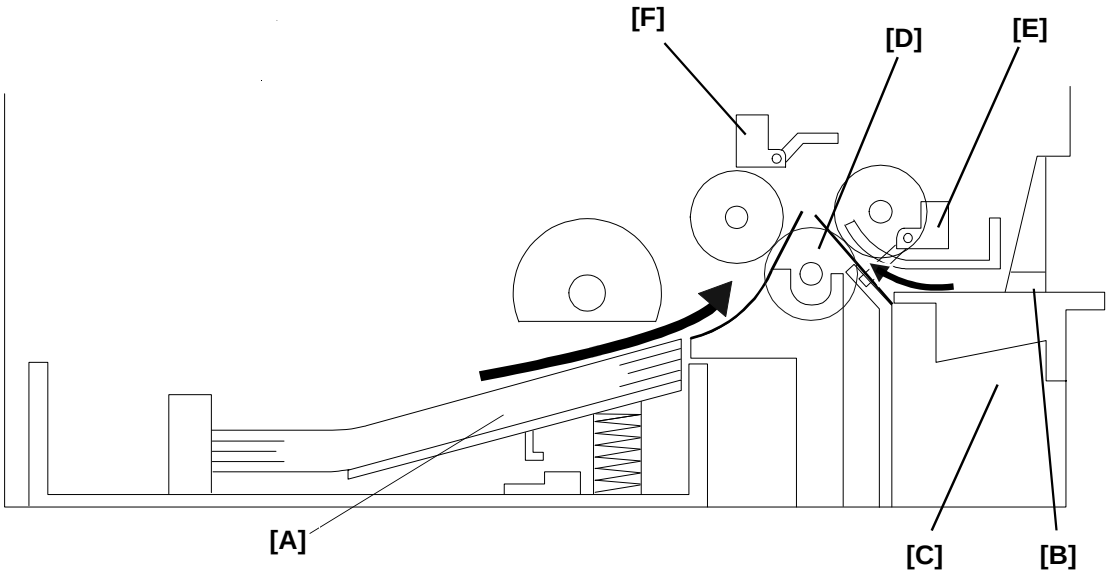
H521D652.wmf

The cpu controls the voltages to the toner application and development rollers using the Bias 0 and Bias 1 signals as shown in the following table.

In	Bias 0	Low	High	Low	High
	Bias 1	Low	Low	High	High
Out	Toner Application Roller	- 700 V	- 50 V	Off	Off
	Development Roller	-400 V	+ 250 V	-400 V	Off

2.2.7. Paper Feed

1. Overview



H521D015.wmf

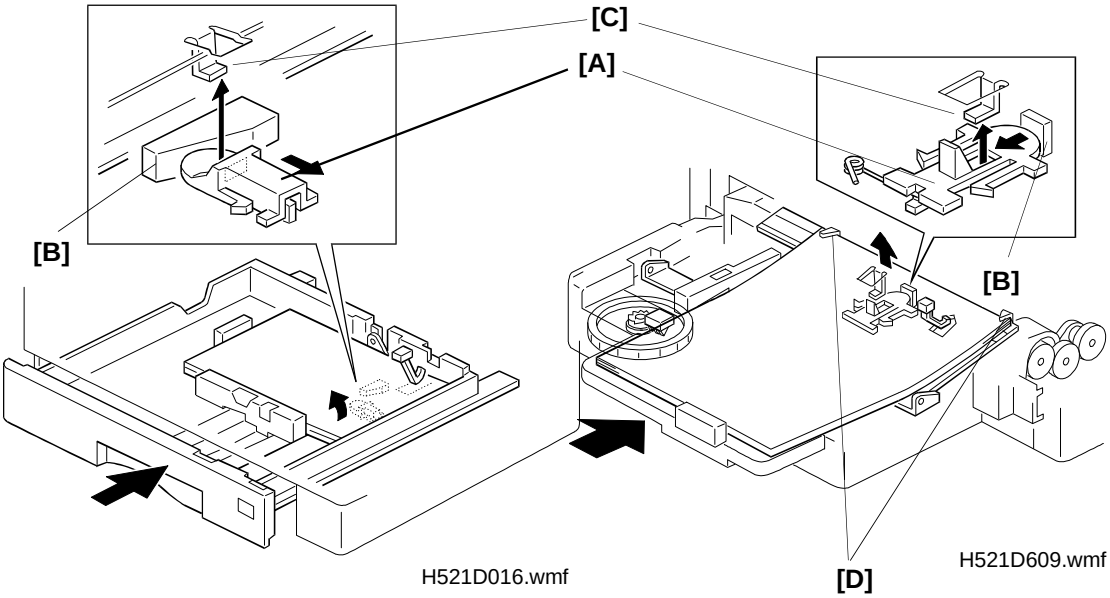
The standard cassette [A] holds 250 sheets and the bypass feed slot [B] feeds 1 sheet at a time. The bypass feed slot can only be used in copy mode. An optional 100 sheet cassette can be fitted into cavity [C].

The registration roller [D] rotates clockwise when the standard cassette is used. It rotates counter-clockwise when the bypass feed slot [B] or the 100 sheet cassette is used.

When a sheet of paper is placed in the bypass feed slot, the bypass feed sensor [E] is turned on, and the machine prefeeds the paper until the registration sensor [F] is turned on.

2. Paper Lift Mechanism

Standard and Optional 100 Sheet Cassette



When the cassette is closed after paper is loaded, the slide lock [A] is pushed by the projection [B] and comes off the bottom hook [C].

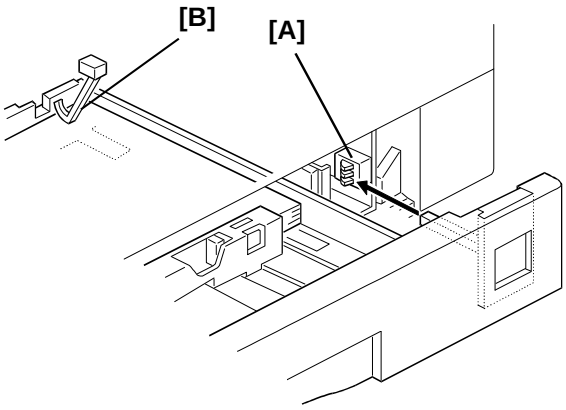
Once the slide lock comes off, the bottom plate is raised by the pressure springs and the top sheet pushes up against the corner separators [D]. This keeps the stack of paper at the correct height.

3. Paper Size and Paper End Detection

Standard Cassette/Optional Universal Cassette

The paper size detector [A] is located at the front of the cassette.
The machine determines which size cassette is installed by monitoring three microswitches.
The machine informs the customer with the Add Paper indicator if the paper size cannot be detected.

When the cassette runs out of paper, the paper end sensor actuator [B] drops through a slot in the bottom plate.



H521D018.wmf

Selectable cassette paper sizes:

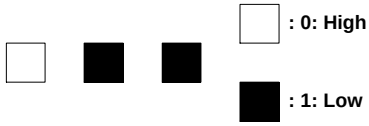
- USA model: Letter, Half-Letter, Legal
- Europe/Asia model: A4, A5, B4, B5, F, F4

The following diagram shows the relationship between the activated microswitches and the selected paper size.

Microswitch	USA Model	Europe/Asia Model
000	-----	-----
001	Legal	F/F4
010	-----	B4
011	Letter	-----
100	-----	B5
101	-----	A4
110	Half-Letter	B5 sideways
111	-----	A5

Example: Letter size paper

Microswitches



H521D658.wmf

Note: "-----" indicates that the machine detects that a cassette is not installed.

Bypass Feed Slot

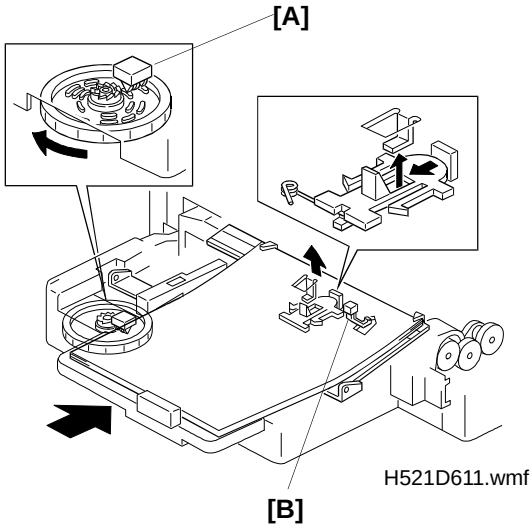
This machine does not detect paper width when the bypass feed slot is used. The maximum feed length for bypass feed is 600 mm. The minimum feedable paper size is 100 mm (width) and 148 mm (length).

Optional 100 Sheet Cassette

The paper size detector [A] is located at the left hand side of the 100 sheet cassette. The microswitches work in the same way as in the standard cassette.

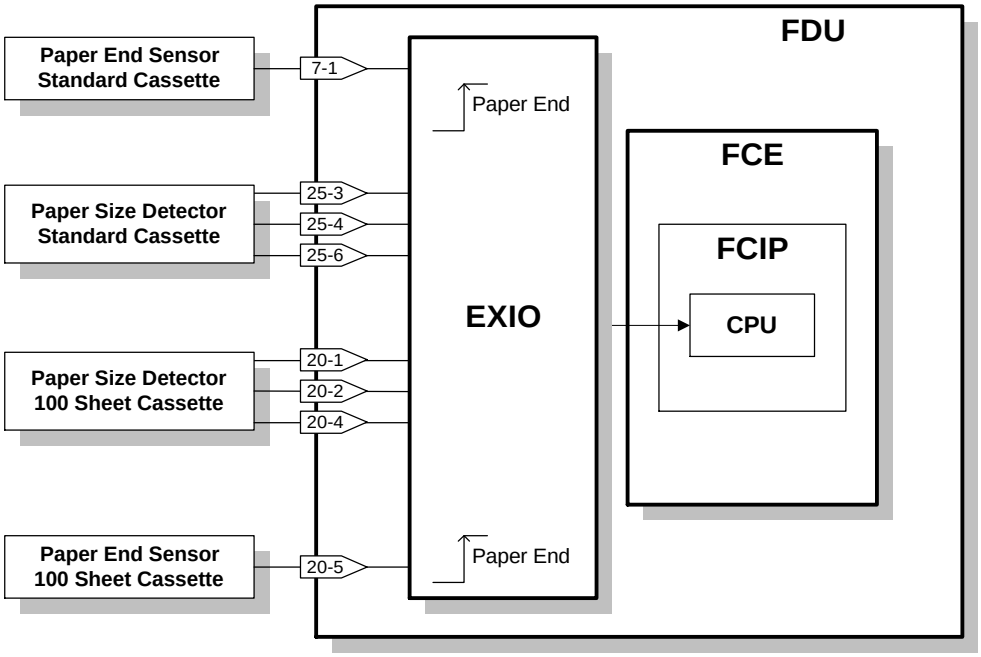
Note:
B4 and B5 sideways paper cannot be used with the 100 sheet cassette.

When the 100 sheet cassette runs out of paper, the paper end sensor actuator [B] drops through a slot to detect paper end.



H521D611.wmf

Paper Size / End Detection



H521D659.wmf

4. Pick-up and Separation

Standard and Optional 100 Sheet Cassettes

The pick-up and separation mechanism is a corner separator type.

Cross-reference
Group 3 Facsimile Manual: section 4-5-4

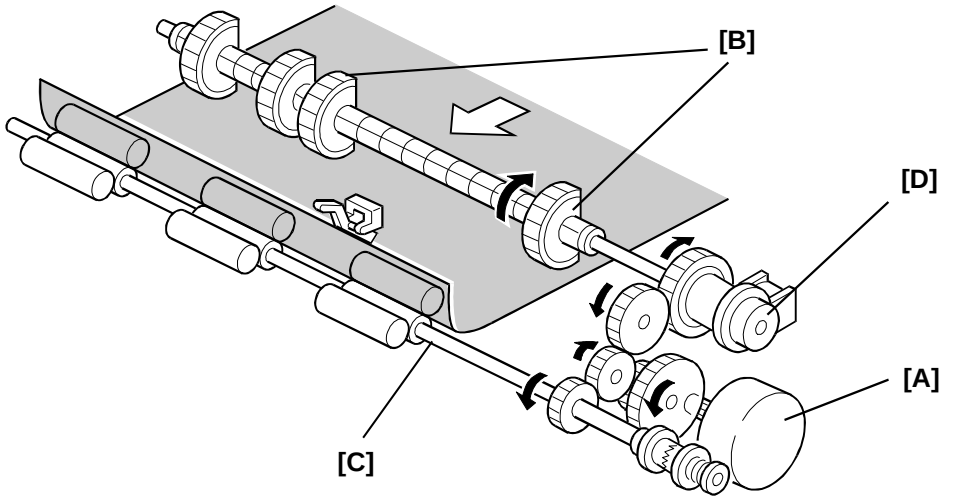
The paper feed motor starts to rotate when the printer is ready for printing.

By-pass Feed Slot

There is no pick-up or separation system in the by-pass feed slot. Only one sheet can be fed from this slot.

5. Drive Mechanism

Standard Cassette



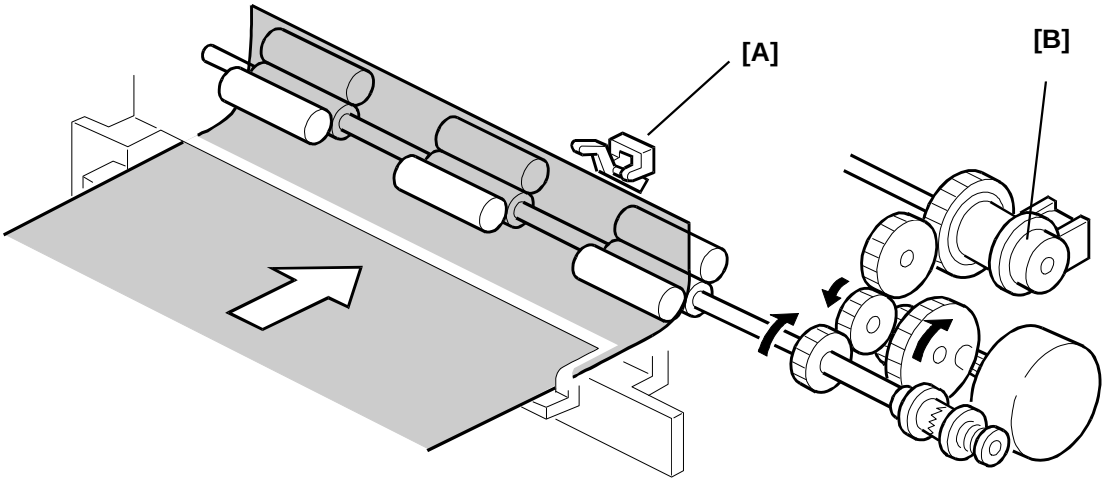
H521D017.wmf

The paper feed motor [A] drives the pick-up and feed mechanism. When the standard cassette is used, the paper feed motor turns clockwise, driving the paper feed rollers [B] and the registration roller [C], as shown in the diagram.

The paper feed clutch [D] turns on to allow the paper feed roller to turn only once for each sheet of paper.

While the registration roller turns counter-clockwise, paper cannot be fed into the machine from the optional 100 sheet cassette or bypass feed slot. This means that if a sheet of paper is placed in the bypass feed slot during printing from the standard cassette, this sheet will not be fed into the machine.

Bypass Feed Slot



H521D019.wmf

When a sheet of paper is placed in the bypass feed slot, the bypass feed sensor is turned on. The machine turns the paper feed motor counter-clockwise to prefeed the paper until the registration sensor [A] is turned on, or for 1 second, whichever is first.

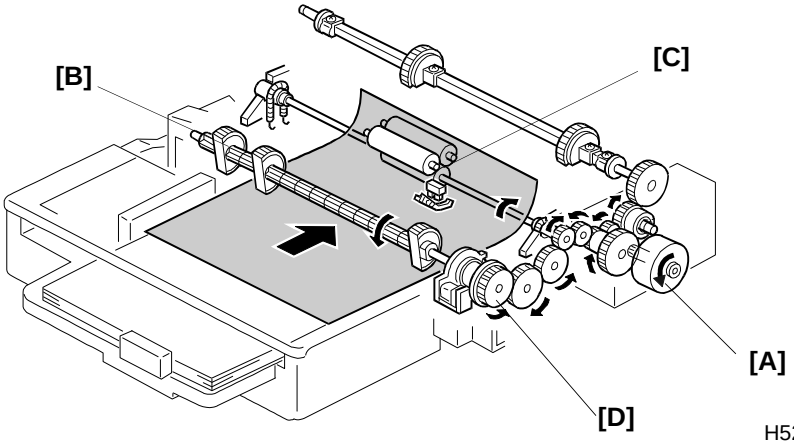
The paper feed clutch [B] is kept off to prevent any drive from being transmitted to the paper feed rollers for the standard cassette when the paper feed motor turns counter-clockwise.

If a sheet of paper remains in the bypass feed slot for longer than the Auto Reset Time (System Switch 0B), the machine will automatically feed it out. The machine will not print incoming messages while there is a sheet of paper in the bypass feed slot, so feeding out the page after the Auto Reset Time allows incoming faxes to be printed even if someone leaves paper in the bypass feed slot.

Sheets of paper longer than about 60 cm cannot be fed from the bypass feed slot, or a paper jam will occur (error code 9-81).

Note that the bypass feed slot can only be used for copying and for printing from the PC using the optional printer interface.

Optional 100 Sheet Cassette



When the machine feeds a sheet of paper from the 100 sheet cassette, the paper feed motor [A] turns counter-clockwise to drive the paper feed rollers [B] and the registration roller [C] as shown in the diagram.

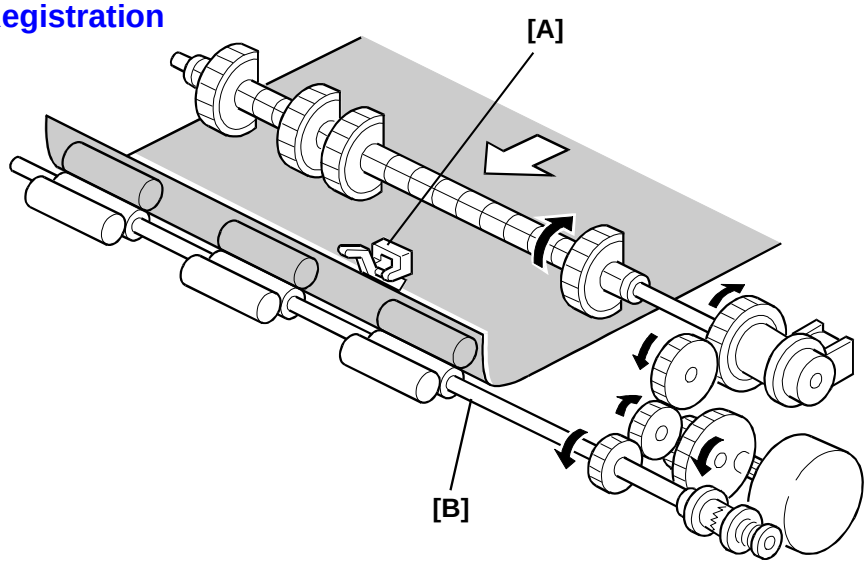
The paper feed clutch [D] ensures that the paper feed roller rotates only once for each sheet of paper.

Paper Feed Priority

If there is an optional cassette installed in the machine, the priority for paper feed is decided in accordance with the following rules.

- The paper in the bypass feed slot has the first priority (for copying and printing from a PC only).
- If the cassettes contain the same paper size, the 100 sheet cassette is used first.
- If the cassettes contain different sizes, the machine selects the paper size as explained in section 2-2-13, "Paper Size Selection".

2.2.8. Registration



H521D017.wmf

The registration sensor [A] is positioned above the registration roller [B].

When a cassette (Standard, Universal, or 100 Sheet Cassette) is used, the machine stops the paper feed motor for a few moments when the registration sensor is turned on.

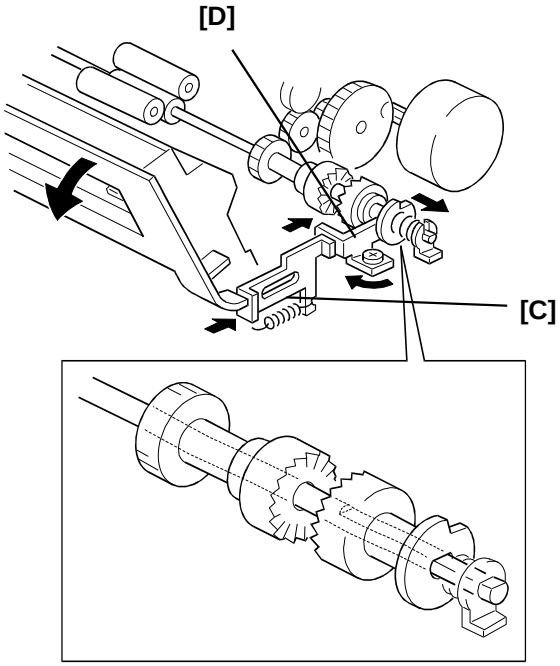
When the bypass feed slot is used, the machine prefeeds the paper until the registration sensor is turned on (or for 1 second, whichever comes first).

Then, the paper feed motor starts rotating immediately after laser scaninng starts.

When the leading edge touches the pressure rollers, the momentum of the paper corrects any skew.

When the fusing unit cover is opened, the door end pushes the spring lever [C] and the release lever [D] as shown in the diagram. This releases drive applied to the registration roller and allows the registration roller to rotate freely, making it easier for a user to remove jammed paper.

This can be done manually by removing the by-pass feed slot cover and pushing the release lever [D].

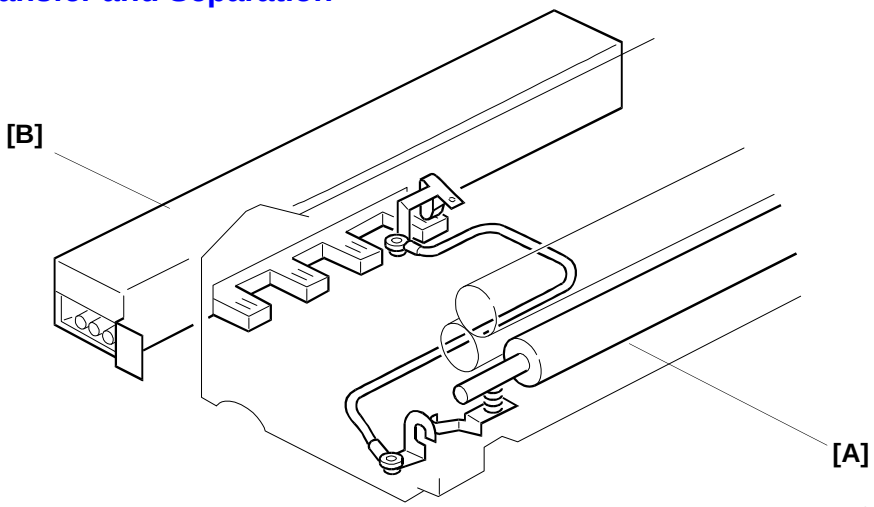


H521D024.wmf

Jam Detection

	Condition	Error Code
When the standard cassette is used	When the registration sensor is not turned on within 2.0 seconds of the paper feed clutch turning on.	9-07
When the standard, 100 sheet cassette, or bypass feed slot is used	When the paper feed out sensor is not turned on within 2.6 seconds after the paper feed motor starts to feed paper for printing (not for prefeed).	9-08
	When the registration sensor is not turned off within X seconds after it turned on. X seconds = (paper length / 67.546) + 3 seconds (67.546 mm/ s : paper feed speed)	9-08
When the bypass feed slot is used	When the registration sensor is not turned on within 2 seconds after the paper feed motor starts rotating for printing. (This error is not generated during prefeed, to allow the users to change their minds after putting paper in this slot. When the bypass feed sensor is turned on, the machine prefeeds the paper for up to 1 second and stops feeding even if the registration sensor is not turned on. If the registration sensor did not turn on at prefeed, the machine checks for the above error.)	9-80
	When the bypass feed sensor is not turned off within 11.9 seconds after it is turned on. Using the same formula as above (error code 9-08), it works out that individual sheets cannot be longer than about 60 cm.	9-81
When the 100 sheet cassette is used.	When the registration sensor is not turned on within 2.0 seconds of the paper feed clutch turning on.	9-82

2.2.9. Transfer and Separation

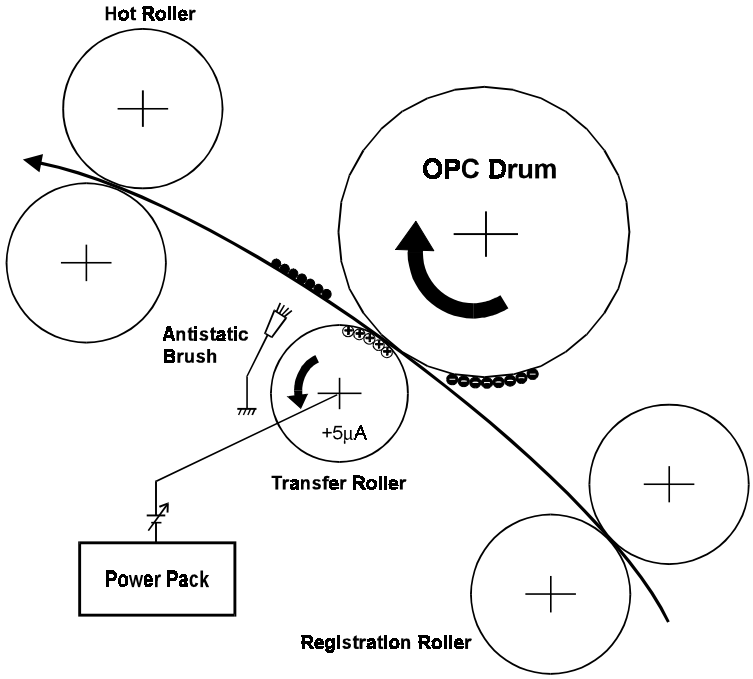


H521D620.wmf

Instead of using a transfer corona wire, this machine uses a transfer roller, which touches the drum surface.

A constant current of +5 ± 0.2 µA is applied to the transfer roller [A] from the power pack [B]. The positively biased transfer roller pulls negatively charged toner off the drum. The curvature of the drum and the antistatic brush helps the paper to drop away from the drum.

Temperature and humidity have less effect on the supply of ions when the transfer current is held constant. With a constant voltage, ions may dissipate in some conditions.



H521D653.wmf

Cleaning Mode

If the paper size is smaller than the printed image, or if a paper jam occurs during printing, toner may be transferred to the the roller surface. To prevent this toner from transferring to the back side of copies, the transfer roller has to be cleaned before the next printing run.

While the machine is in the cleaning mode, the power pack supplies -1000V± 50V to the transfer roller, and charges the drum to -750 V. The negatively charged toner on the transfer roller is then transferred back to the drum.

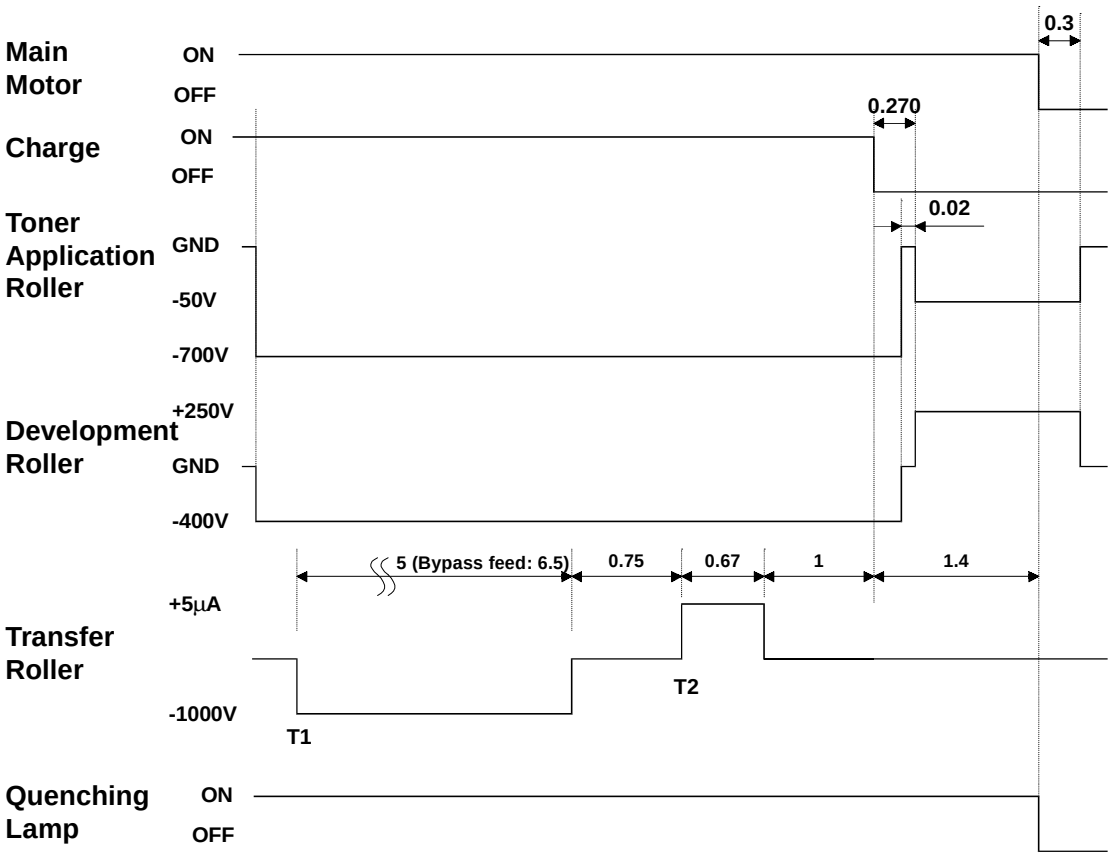
The machine goes through the cleaning mode in the following conditions:

- At power-up (the process starts when the fusing temperature reaches half of the standby temperature)
- When the cover is opened and then closed during the printing process.
- After a printer jam has been cleared.
- After the bypass feed slot has been used (each page): This is done only if printer switch 00 bit 3 is set to 1.

The cpu controls the transfer roller voltage through the power pack using the Transfer 0 and Transfer 1 signals as shown below (for a circuit diagram, see Bias Control in section 2-2-6).

In	Transfer 0	Low	High	Low	High
	Transfer 1	Low	Low	High	High
Out	Transfer Roller	+ 5 μA	- 1000 V	Off	Off

Timing Chart: Cleaning Mode



H521D663.wmf

Before cleaning starts, the main motor, charge corona, and quenching lamp turn on.

T1. Cleaning bias is applied to the transfer roller.

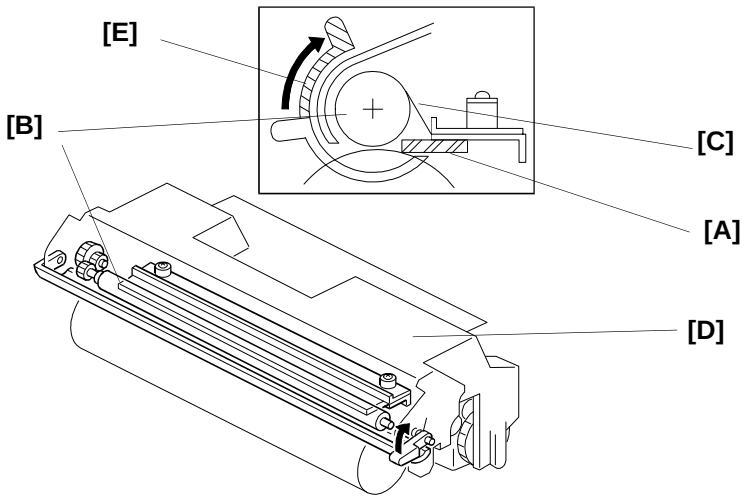
T2. A positive constant current of + 5 ± 0.2 μA is applied to transfer back to the drum any toner which is positively charged by the transfer roller.

2.2.10. Cleaning

The cleaning unit and the used toner tank are contained in the CTM.

The cleaning blade [A] removes any toner remaining on the drum after the image is transferred to the paper. A magnetic roller [B] then brings the toner into the used toner tank [D]. The mylar blade [C] scrapes the toner off the magnetic roller into the used toner tank [D].

When the CTM is removed from the machine, the cleaning roller cover [E] is closed by a spring. This prevents removed toner from falling out of the unit.



H521D621.wmf

There is no used toner overflow detection mechanism because the used toner tank is large enough for the lifetime of the CTM.

2.2.11. Fusing

Fusing Lamp Control

When the main switch is turned on, the machine turns on the fusing lamp and raises the fusing temperature to 80 °C in about 6 s. For printing, the machine raises the fusing temperature to 185 °C.

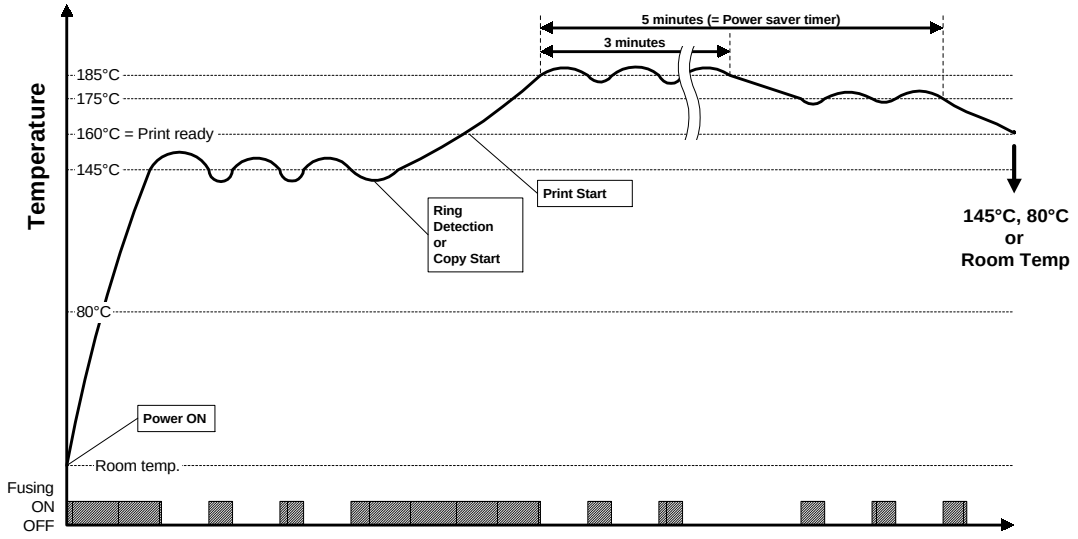
When the Power Saver Key is pressed or the power saver timer expires, the machine goes into a power saver mode. In Level 2 Power Saver Mode, the fusing lamp is turned off. For Power Saver Mode Level 1, the user can select whether to keep the fusing lamp off, or at 80 °C or at 145 °C.

Cross Reference:
Power Saver Modes: Section 2-3

If the printing operation continues for more than 3 minutes, the machine keeps the fusing temperature at 175°C.

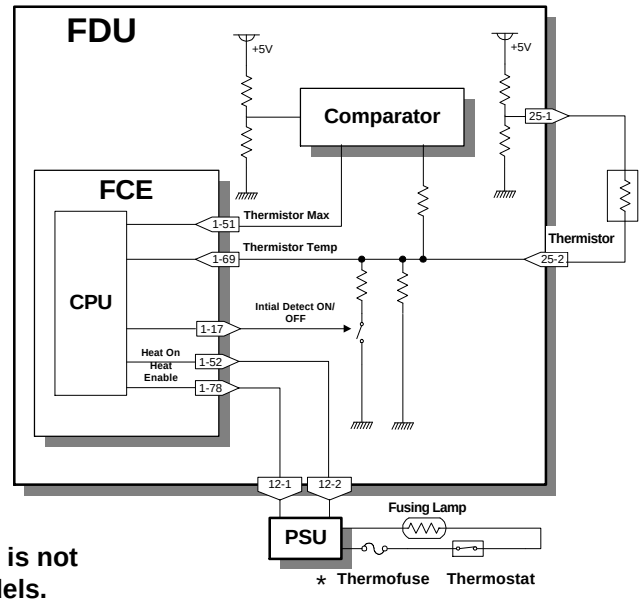
Points to Note:

- Standby temperature: 145 °C
- Printing start temperature: 160 °C
- Printing temperature: 185 °C (monitored by a comparator)
- Thermistor maximum: 250 °C
- Thermostat maximum: 150 °C (the temperature of the hot roller would be about 400 °C)
- Thermofuse maximum: 169 °C (the temperature of the hot roller would be about 400 °C) - The thermofuse is not used in USA models.



H521D654.wmf

Fusing Control



*** The thermofuse is not used in USA models.**

H521D662.wmf

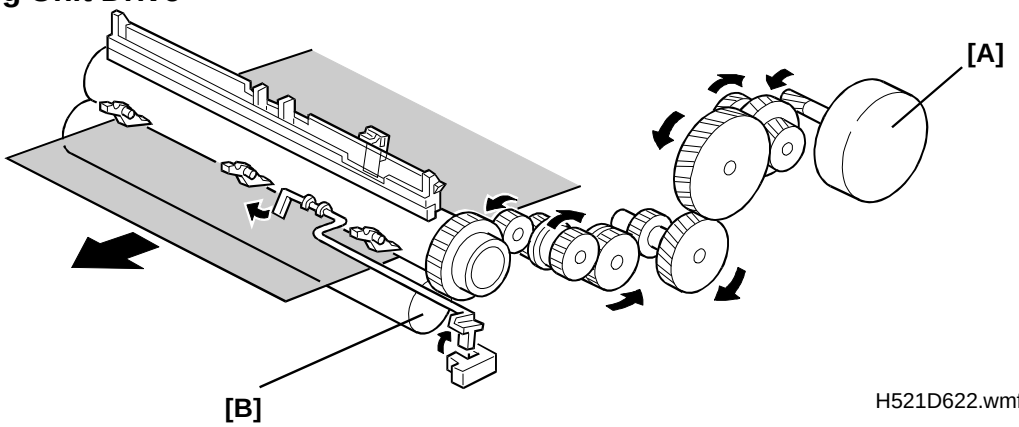
During normal operation, the cpu controls the fusing lamp based on input from the thermistor using the above circuit.

When the machine switches on, or when it comes back from the Level 2 Power Saver Mode, it checks whether the thermistor circuit is intact by temporarily closing the initial detect switch circuit on the FDU. If the thermistor is connected properly, the machine begins normal operation. If it is not, an Auto Service Call (error code 9-22, sub-code 09) is generated.

As a backup safety measure, when the temperature of the hot roller reaches about 400 °C, the thermostat and/or the thermofuse open (the thermofuse is not installed in USA models).

The machine turns on the cooling fan when the fusing temperature reaches 120 °C. It is turned off when the fusing temperature drops below 120 °C.

Fusing Unit Drive



The main motor [A] drives the fusing unit through a gear train. The paper feed-out sensor [B] detects when the paper is fed out of the unit.

Jam Detection - Paper Feed Out

The machine detects a paper jam when the paper feed out sensor is not turned off within X seconds or more after it is turned on (error Code 9-09).

X seconds = (paper length / 67.546) + 3 seconds
(67.546 mm/s is the paper feed speed)

These conditions are the same for the standard (universal) cassette, bypass feed, and optional 100 sheet cassette.

Service Call Conditions

	Conditions	Error Code (9-22)
At power on	If there is any problem with the thermistor. (This detection is also done when the machine comes back to the normal mode from the Power Saver Mode Level 2.)	Sub-code 09
Standby mode	If the fusing temperature stays below 80 °C for more than 18 seconds when power saver standby temperature (80 °C) is selected in Power Saver Mode Level 1. Or, if the fusing temperature stays below 145 °C for more than 25 seconds when the standby temperature (145 °C) is selected in Power Saver Mode Level 1.	Sub-code 05
	If the fusing temperature takes more than 40 seconds to reach 160 °C from the standby temperature.	Sub-code 02
During printing	If the fusing temperature stays above 185 °C for more than 40 seconds.	Sub-code 01
	If the fusing temperature comes below 140 °C during printing.	Sub-code 07
After printing	If the fusing temperature takes more than 20 minutes to go down to below 100 °C when the machine goes into the Power Saver Mode Level 1. (When fusing lamp OFF is selected for Power Saver Mode Level 1.)	Sub-code 03
	Either: If the fusing temperature takes more than 20 minutes to go down to below 100 °C when the machine goes into the Power Saver Mode Level 1 (when the power saver standby temperature of 80 °C is selected for Power Saver Mode Level 1.) Or: If the fusing temperature takes more than 5 minutes to go down to the standby temperature (145 °C) when the standby temperature is selected for Power Saver Mode Level 1.	Sub-code 04
At any time	If the fusing temperature reaches 250°C.	Sub-code 08

2.2.12. Page Separation and Data Reduction

Incoming pages that are only slightly longer than the copy paper may be reduced in the sub-scan direction. Whether or not this happens depends on the settings of printer bit switches 04 and 05.

Reduction Enabled

If bit 0 of printer switch 03 is at 1 (Enabled), the data will be reduced in the page memory to fit on the copy paper. However, data will only be reduced if the length of the incoming page is between 5 mm shorter and a certain maximum length. This maximum incoming page length that can be reduced depends on the copy paper size and on the reduction ratio stored in printer switches 04 and 05.

Each paper size can be programmed with a separate reduction ratio. In each of the two bit switches, there is one bit for each possible paper size. The combination of the bit settings determines the ratio for that paper size.

Bit No. / Switch No.	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Not used	B4	Legal	F	A4	B5 Letter	B5 sideways	A5 sideways HLT
Sw 04	0: 3/2	1: 4/3		0: 8/7		1: 12/11		
Sw 05	0:	0:		1:		1:		

The following table shows the maximum incoming page length that can be reduced for each copy paper size. All length are in millimeters. The factory setting of the reduction ratio is 4/3.

USA Model

Copy Paper Type	Copy Paper Length	Maximum reducible incoming page lengths		
		Ratio = 4/3	Ratio = 8/7	Ratio = 12/11
Half-Letter	139.5	179.0	153.2	146.5
Letter	279.2	365.2	313.0	298.7
Legal	355.6	467.0	400.3	382.1

Europe/Asia Model

Copy Paper Type	Copy Paper Length	Maximum reducible incoming page lengths		
		Ratio = 4/3	Ratio = 8/7	Ratio = 12/11
A5	147.8	190.1	162.9	155.3
B5	181.8	235.8	201.8	192.5
A4	296.9	388.8	333.2	318.2
F/F4	330.1	433.2	371.2	354.3
B4	363.9	478.2	409.9	391.1

Incoming pages that are longer than the maximum length will not be reduced, but will be printed on two pages and treated in accordance with the setting of bit 1 of bit printer switch 00. If this bit is 1, the bottom few lines of the page will continue from where the first page left off.

Reduction Disabled

If bit 0 of printer switch 03 is at 0 (Disabled), the data will not be reduced. However, if the incoming page is up to x mm longer than the copy paper, the excess portion will not printed. The value of x can be from 0 to 15 mm. It is determined by the setting of bits 4 to 7 of printer switch 03.

Hex value	Value of X
0	0
0	1
and so on until	
F	15

Messages more than x mm longer than the copy paper will be printed out on two pages in accordance with the setting of bit 1 of printer switch 00 as explained earlier.

2.2.13. Paper Size Selection

If there is an optional cassette installed in the machine, the paper size to use is decided in accordance with the following rules.

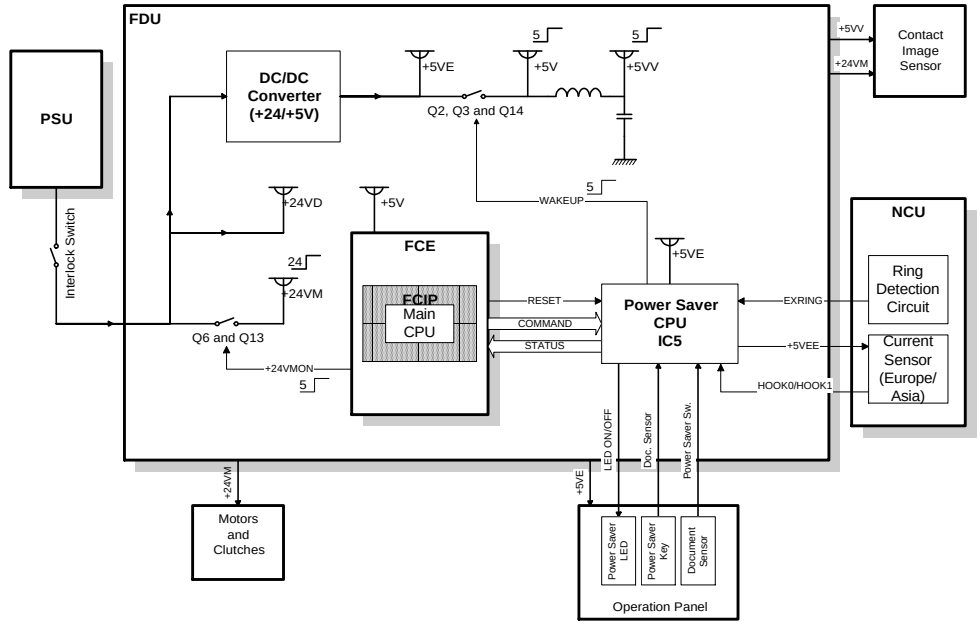
- If both cassettes contain the same paper size, the 100 sheet cassette will be used.
- If the received page has to be split up and printed on two pages, both pages will be the same size.
- If the cassettes contain different sizes, the paper size chosen for printing the received fax message is selected in accordance with the following table of priorities. The table assumes that reduction is enabled and that the reduction ratio is 4/3.

Received Fax Message Size	Selected Paper Size							
	HLT	A5	LT	A4	F,F4	LG	B5	B4
Half-Letter	1	2 sideways	3	4	5	6	7 sideways	8
A5 sideways		1 sideways	2	3	4	5	6 sideways	7
Letter	7(SR)	6(SR) sideways	1	2	3	4	8(SR) sideways	5
A4	7(SR)	6(SR) sideways	5(R)	1	2	3	8(SR) sideways	4
F, F4	7(SR)	6(SR) sideways	5(R)	4(R)	1	2	8(SR) sideways	3
Legal	7(SR)	6(SR) sideways	5(R)	4(R)	3(R)	1	8(SR)	2
B5 sideways							1 sideways	2
B4							2(SR) sideways	1

- The paper size priority is graded from 1 to 5.
- S: The data has to be separated and printed on more than on page.
- R: The data is reduced to fit on the printer paper.
- Some of the reports can be printed on A5 paper without page separation. However, if only A5 paper is in the cassettes, reports that need larger paper sizes will require page separation.

2.3. SYSTEM FEATURES

2.3.1. Power Saver Modes



h521d625.wmf

The machine has three levels of power saver mode as shown below.

	Normal	Level 0	Level 1	Level 2
Main CPU	ON	ON	ON	OFF
Power Saver CPU	OFF	OFF	OFF	ON
Power Saver LED	OFF	ON	ON	ON
LCD/LED	ON	OFF	OFF	OFF
+5V Power Supply	ON	ON	ON	OFF
+24VM Power Supply	ON	ON	ON	OFF
Fusing Lamp	ON	Standby temp. or OFF	Standby temp. or OFF	OFF
+24VM Power Supply	ON	ON	ON	OFF

In power saver mode levels 0 and 1, the main CPU monitors and controls the system. The fusing lamp is either turned off or kept at the standby temperature, depending on the setting of User Parameter Switch 05, bits 6 and 7.

In level 2, the main CPU and dc power supplies are shut down. The power saver CPU monitors the power saver key, incoming calls, and the document sensor. When the power saver CPU detects activity at one of these, it activates the +5V supply with the WAKEUP signal to start up the main CPU.

The following sections explain how the machine controls these three modes. Note that power saver mode does not operate if an optional printer interface or RS232C kit is installed.

1. Going into a Power Saver Mode

The flow chart on the next page explains how the machine goes into a power saver mode, depending on parameter settings and other machine conditions.

Entering Power Saver Mode from Standby

- Power Saver Timer -
When the power saver timer expires since the last time a condition #1 operation was detected (see the flow chart), the machine automatically goes into a Power Saver Mode. See the point marked 1 on the flow chart.

> **Cross Reference**
> Power saver timer initial setting: System Switch 0B, bits 2 and 3
> (1 minute, 3 minutes, 5 minutes, or Unlimited: Timer disabled)

- Power Saver Key -
When this key is pressed, the machine checks if there are any background operations in progress (these are the condition #2 operations on the flow chart). If there are none, the machine will automatically go into a Power Saver Mode. See point 2 on the flow chart.

Which Power Saver Mode is Selected?

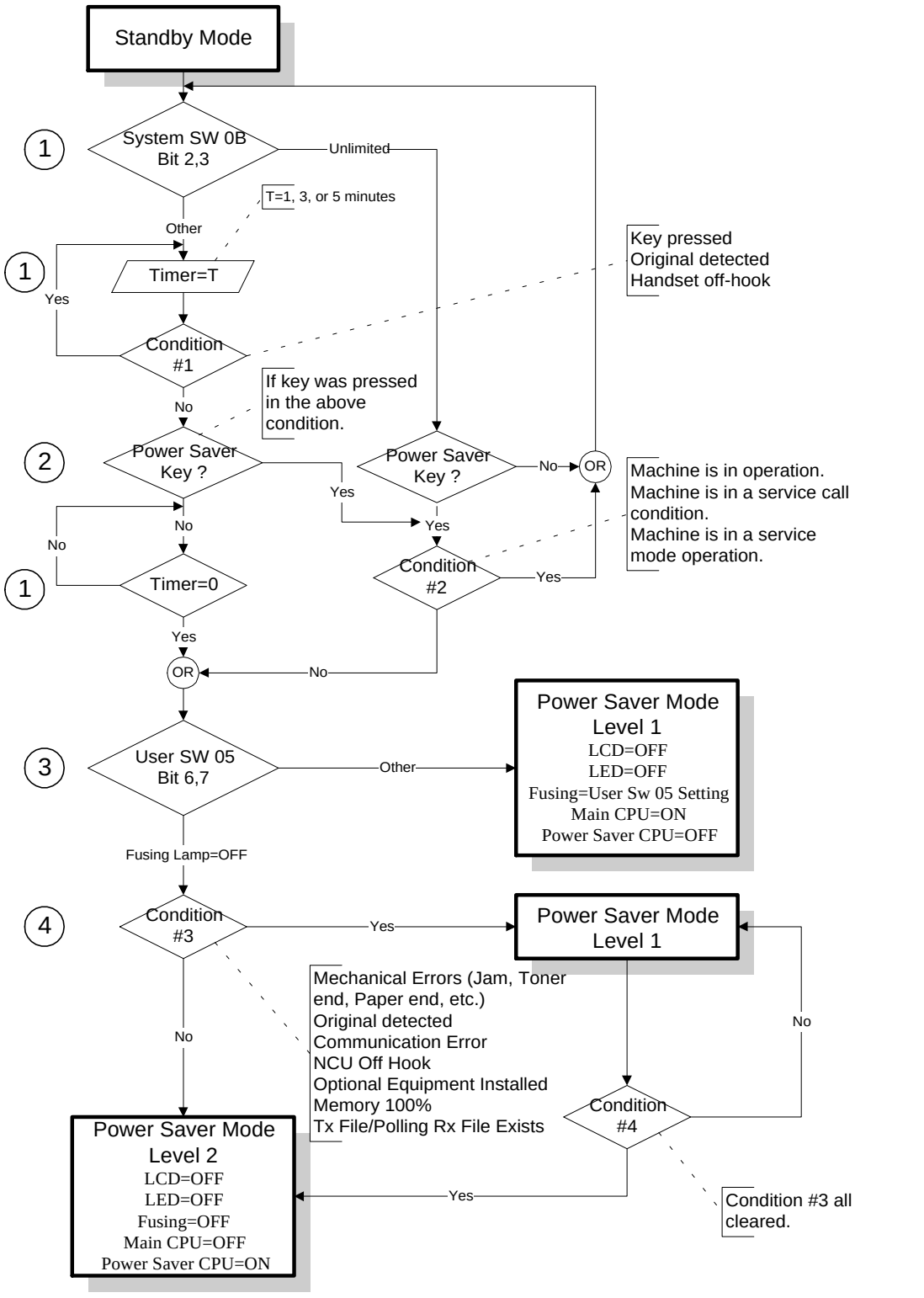
If User Switch 05, bits 6 and 7 are set to maintain the fusing lamp at a certain temperature during Power Saver Mode, the machine enters Power Saver Mode Level 1. See point 3 on the flow chart.

If User Switch 05, bits 6 and 7 are set to keep the fusing lamp off during Power Saver Mode, the machine checks for events listed on the flow chart as condition #3 events (see point 4 on the flow chart). If none exist, the machine goes to Power Saver Level 2. If one or more does exist, the machine enters Power Saver Level 1 until the conditions are all cleared. then it goes to Power Saver Level 2.

See the next flow chart for more details on how the machine changes from Level 1 to Level 2.

> **Cross Reference**
> Fusing lamp control during Power Saver Mode: User Switch 05, bits 6 and 7
> (On at printing temperature, On at standby temperature, or Off)

> **Note**
> The "optional equipment" in condition #3 is either a Printer Interface or a RS232C Interface.



h521d626.wmf

2. Going into Level 2 Mode from Level 1 Mode

The flow chart on the next page shows in more detail how the machine goes from Power Saver Mode Level 1 to Level 2.

The machine will not go into Level 2 power saver mode if one of the following conditions exists.

- Either a tx/rx/polling file is stored in the memory.
- SAF memory not empty
- Mechanical error(s)
- NCU off-hook
- Optional equipment installed (a printer interface and/or a RS232C interface)

If there is a tx file in the memory

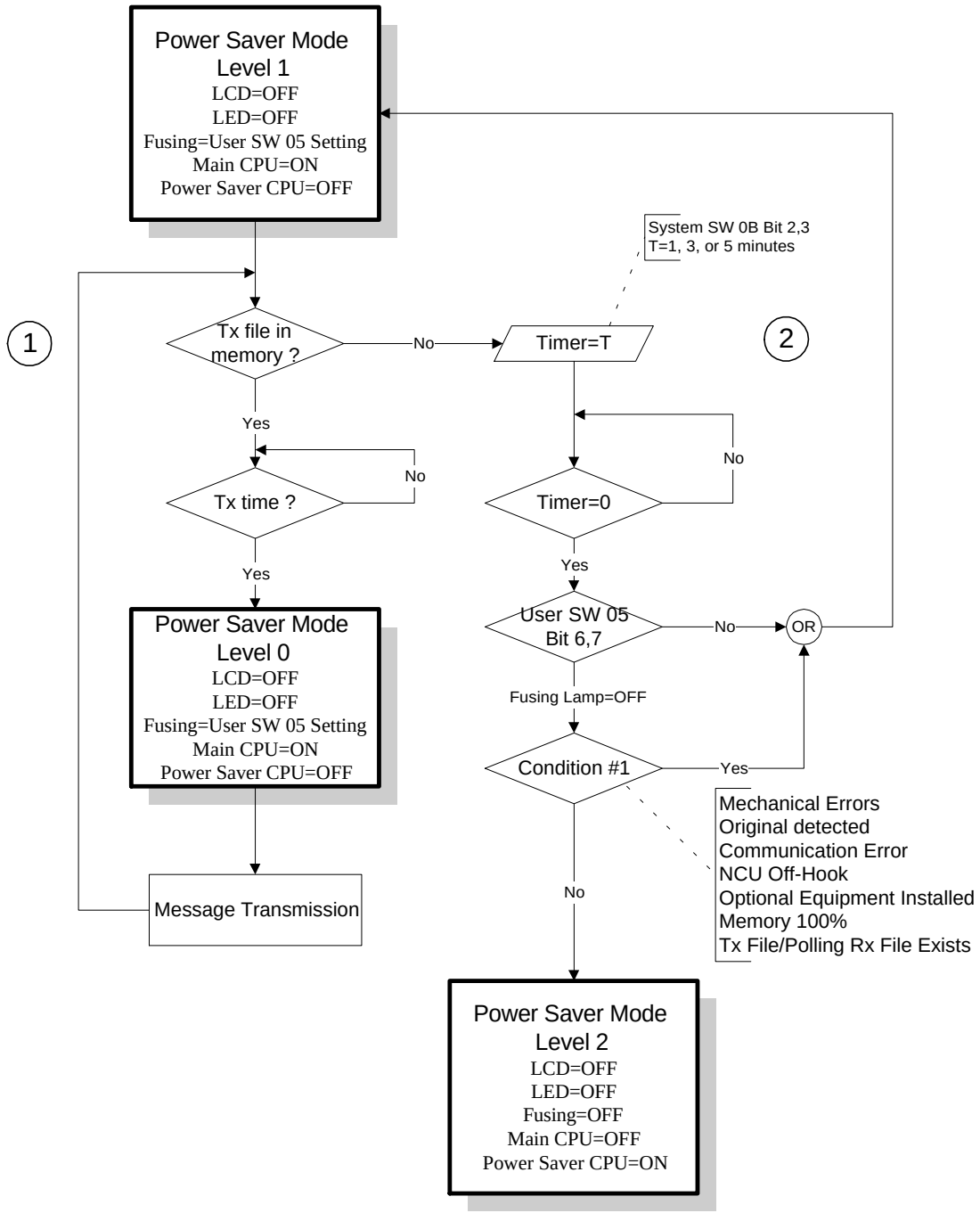
The machine stays in Power Saver Mode Level 1 until it is time to send the message. The machine then enters Level 0 while the message is sent. See point 1 on the flow chart.

When the Power Saver timer expires

When the power saver timer expires after the machine entered Level 1 for the first time (or, if a tx file was present, after the message was transmitted), the machine will enter Level 2 if both of the following are met:

- User Switch 05, bits 6 and 7 specify Fusing Lamp Off
- No condition #1 restrictions exist.

See point 2 on the flow chart.



h521d627.wmf

3. Receiving a Fax Message in Power Saver Mode

The flow chart on the next page explains how the machine receives a fax message while it is in a power saver mode.

Ring Detection

While the machine is in a power saver mode, the power saver CPU monitors ringing signals from the line. When the power saver CPU has detected two ringing signals, it activates the +5V supply to the main CPU and passes the ring detection process to the main CPU.

After the main CPU has detected a ringing signal, the machine goes to Power Saver Mode Level 0 and receives the fax into memory. Level 0 mode looks the same as the previous mode for users, but all the system components are active in the background for receiving a fax message.

See point 1 on the flow chart.

Printing

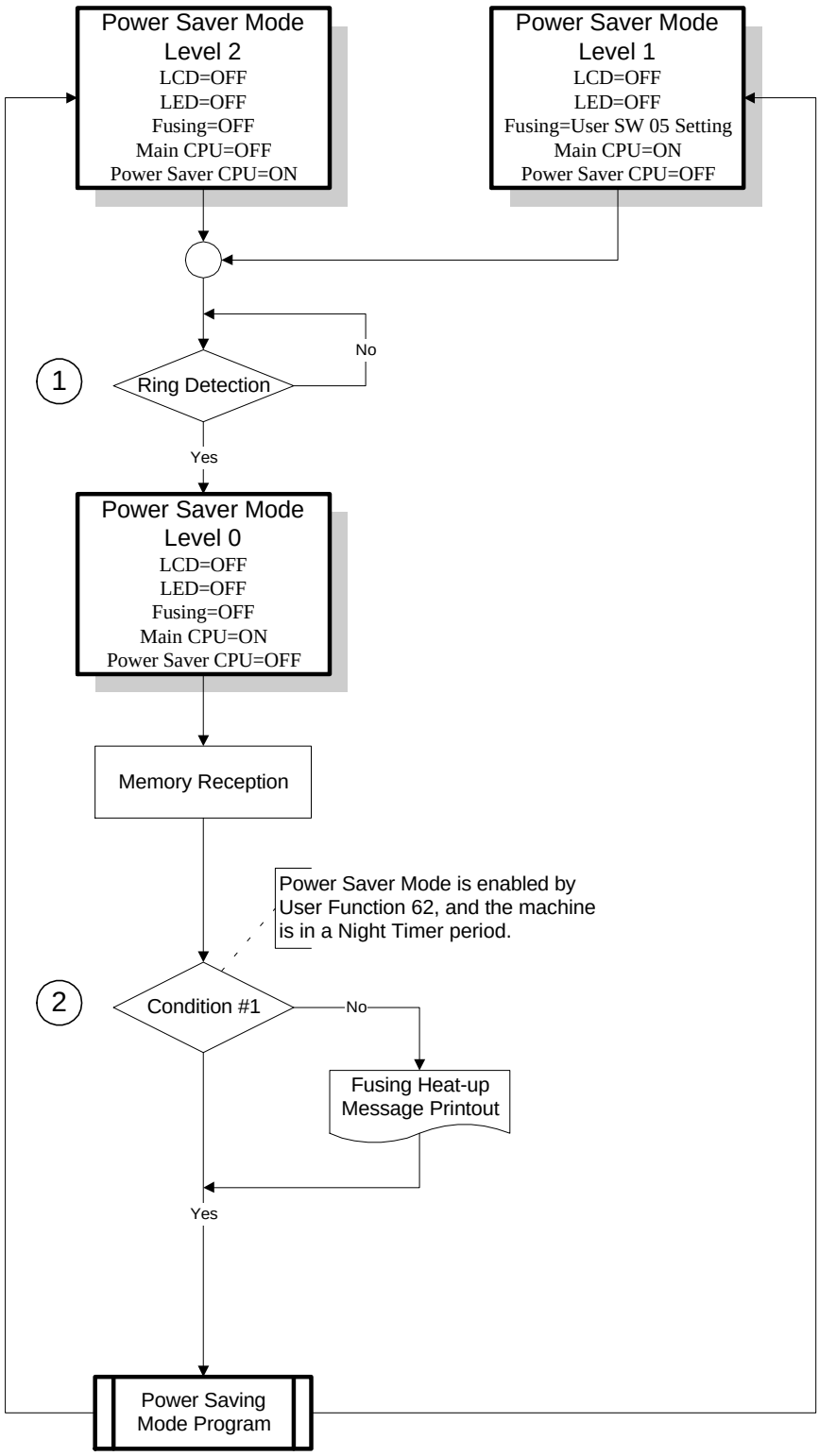
If either of the following conditions is not met (condition #1 on the flow chart), the machine will print out the fax message then return to Power Saver Mode in the manner described in the previous two flow charts in this section.

- Power Saver mode is activated during the Night Timer period
- The machine is currently in the Night Timer period.

If both conditions are met, the machine returns to Power Saver Mode as described in the previous two flow charts in this section. It will print the fax message after the Night Timer expires.

See point 2 on the flow chart.

Cross Reference
Night Timer On/Off: User Function 62
Programming the Night Timer period: User Function 72



h521d628.wmf

4. Sending a Fax Message or Copying in Power Saver Mode

The flow chart on the next page explains how the machine wakes up from power saver mode upon a manual operation, and how it comes back to a power saver mode.

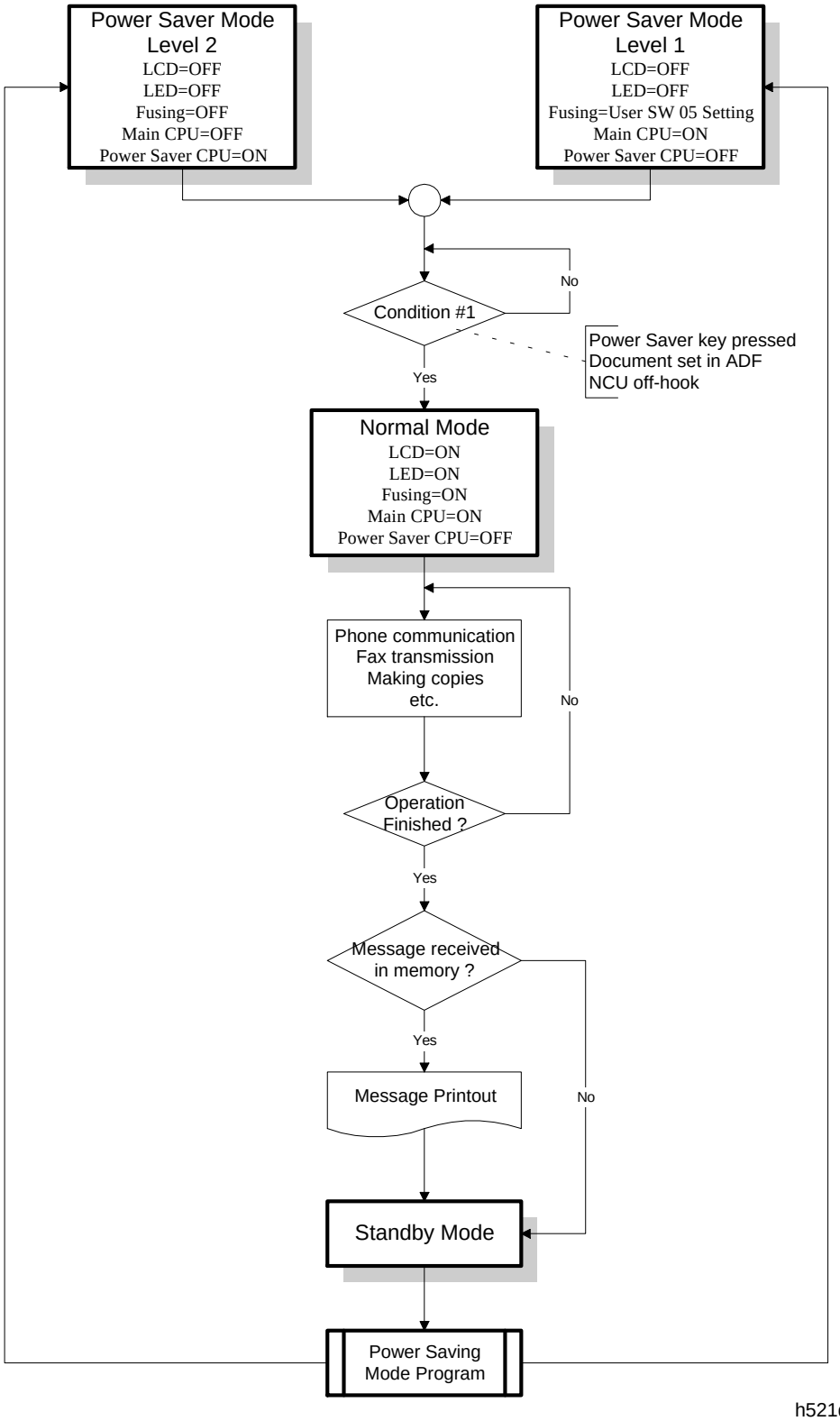
Manual Wakeup Conditions

While the machine is in a power saver mode, either the power saver CPU (Level 2) or the main CPU (Level 1) monitors signals from the following (condition #1 on the flow chart).

- Power saver key
- Document sensor
- Off-hook detector on the NCU

When a signal from one of these has been detected, the CPU wakes up all the components and the machine enters normal operating mode, even during the Night Timer period.

After operations have been finished, the machine goes back to a power saver mode as explained in the previous sections.



h521d629.wmf

2.3.2. Automatic Service Calls

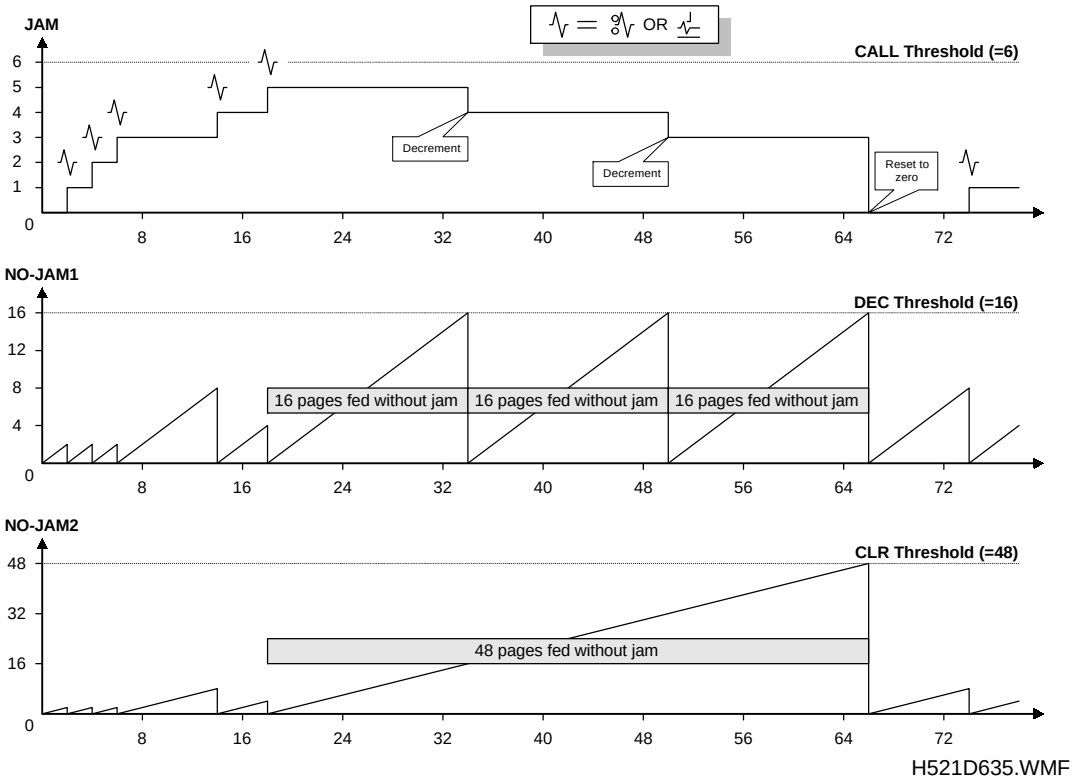
1. Service Call Conditions

The machine makes an automatic service call when one of the following conditions occurs.

Service Call Conditions	Error Code	Sub-code (8003B5H)
Charge corona unit failure	9-17	11 or 12
Laser diode failure	9-20	21
Fusing lamp failure	9-22	01 to 09
Polygonal mirror motor failure	9-23	31 or 32
Main motor failure	9-24	41 or 42
Excessive jams in the ADF/scanner	None	None
Excessive jams in the printer	None	None
The PM counter has reached the threshold (60,000 prints)	None	None
The PM interval has expired	None	None

Cross reference
Service station number: Service Function 13
Troubleshooting: Chapter 6

2. Excessive Jam Alarms



The excessive jam alarm automatically notifies the service station when the machine's scanner or printer frequently has jam problems.

Each type of jam has three counters allocated to it (JAM, NO-JAM1, NO-JAM2). Each of these counters has a threshold value (CALL, DEC, and CLR respectively; these can be adjusted.) The machine uses these counters to monitor jams as follows.

Each time a jam occurs: The JAM counter is increased by 1, and NO-JAM1 and NO-JAM2 are both set to zero. When JAM reaches CALL (6 by default), the machine sends an Auto Service Report with a System Parameter List.

If a sheet of paper is fed without a jam occuring: NO-JAM1 and NO-JAM2 are both incremented by 1. When NO-JAM1 reaches DEC (16 by default), NO-JAM1 is set to zero, and JAM is decremented by 1. When NO-JAM2 reaches CLR (48 by default), NO-JAM2 and JAM are both reset to zero.

The CALL, DEC, and CLR thresholds can be adjusted for each type of jam by rewriting RAM data. The addresses of these thresholds are given on the next page.

Parameters	Address (H)		Initial Settings	Sys. Para. List
	ADF	Printer		
DEC (1 - 255; 0 = Disabled)	8001DD	8001E1	10 (H)	X
CALL (3 - 15; 0 = Disabled)	8001DE	8001E2	06 (H)	Y
CLR (Low)	8001DF	8001E3	30 (H)	—
(High)	8001E0	8001E4	00 (H)	

Counters	Address (H)		Sys. Para. List
	ADF	Printer	
JAM: Jam counter used to place a service call	8001D6	8001DA	Z
NO-JAM1: Counter used for JAM counter decrement	8001D5	8001D9	—
NO-JAM2: Counter used for clearing the JAM counter	8001D7 (Low)	8001DB (Low)	—
	8001D8 (High)	8001DC (High)	

The system parameter list gives the current DEC and CALL thresholds and JAM counter value as X, Y, and Z respectively.

The Call Service indicator does not light for an excessive jam alarm, and the machine can be operated normally after the automatic service call has been made. Also, the counters related to the jam location are reset to zero automatically after the call. Then the alarm is disabled until either bit 3 or bit 4 of address 80033d is reset to zero.

3. Periodic Service Call

The periodic service call notifies the condition of the machine to the service station. The call is made periodically at a time interval programmed in the following RAM addresses.

Parameters		Address (H)
Call interval: 01 through 15 month(s) (BCD) 00: Periodic Service Call Disabled		800256
Date and time of the next call		
	Year: last two digits of the year (BCD)	800257
	Month: 01 through 12 (BCD)	800258
	Day: 01 through 31 (BCD)	800259
	Hour: 00 through 23 (BCD)	80025A

To change these settings after programming, change the call interval. Then the machine automatically changes the remaining parameters by referring to the interval and the current date and time.

The Call Service indicator does not light for a periodic service call, so that the machine can be operated normally after it has sent the service call.

4. PM Call

If PM call is enabled, the machine will make an automatic service call when the PM counter reaches the PM threshold.

Program the PM call interval at the following RAM addresses.
(Default setting: 60,000 sheets)

Address (H)	Bits 7 - 4	Bits 3 - 0
800194	Tens	Units
800195	Thousands	Hundreds
800196	Hundred thousands	Ten thousands

Cross reference
PM call enable/disable: System switch 01, bit 0

The Call Service indicator does not light for a PM service call, and the machine can be operated normally after it has made the service call.

5. Effective Term of Service Calls

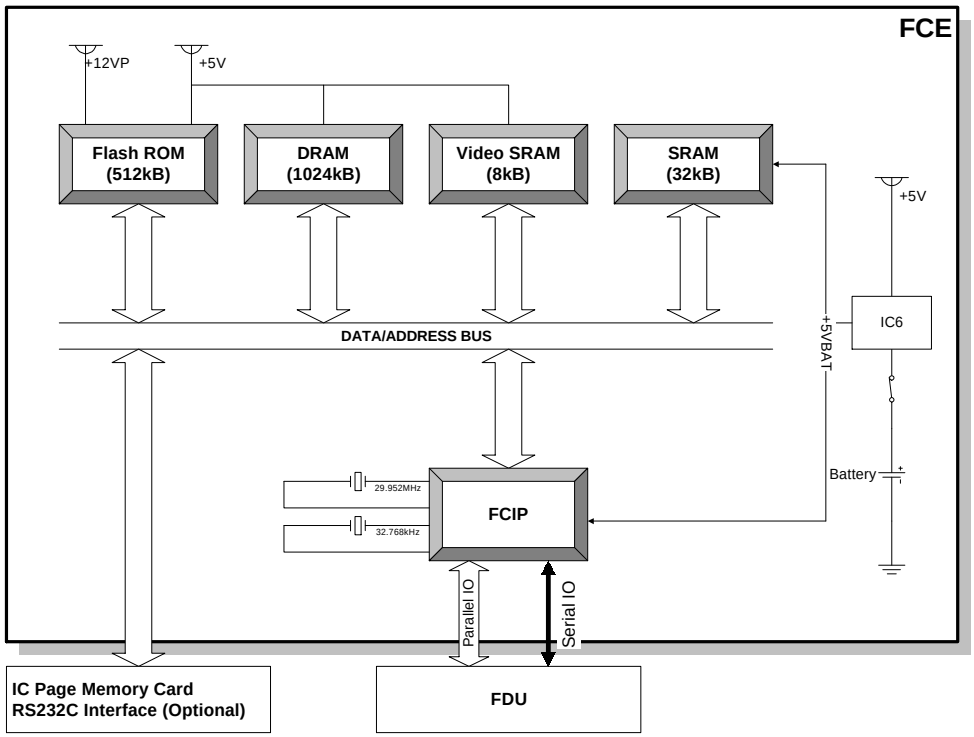
If a time limit for the effectiveness of service calls is programmed, the machine stops making automatic service calls after the time limit.

Program the time limit at the following addresses. This function is disabled when all of these addresses are 00(H).

	Address (H)
Year: last two digits of the year (BCD)	800261
Month: 01 through 12 (BCD)	800262
Day: 01 through 31 (BCD)	800263

2.4. PCBs

2.4.1. FCE



h521d630.wmf

1. FCIP (Facsimile Controller and Image Processor)

- CPU
- Modem (V.29, V.27, V.21)
- Data compression and reconstruction
- Digital image processor
- Laser interface
- DMA controller
- Clock generation
- Stepper motor control
- Serial interface to the FDU
- DRAM backup control
- Ringing signal/Tone detection
- Fusing lamp control

2. ROM

- 512 kB (4 Mbit) flash ROM for system software storage.

3. DRAM

- 1024 kB DRAM shared between the Line Buffer (32 kB), ECM Buffer (64 kB or 128 kB), Page Memory (3 MB), and SAF memory (576 kB).
- Backed up by the battery on the FDU.

4. SRAM

- 32 kB SRAM for system and user parameter storage.
- Backed up by the battery on the FCE.

5. Video SRAM

- 8 kB SRAM for video processing.

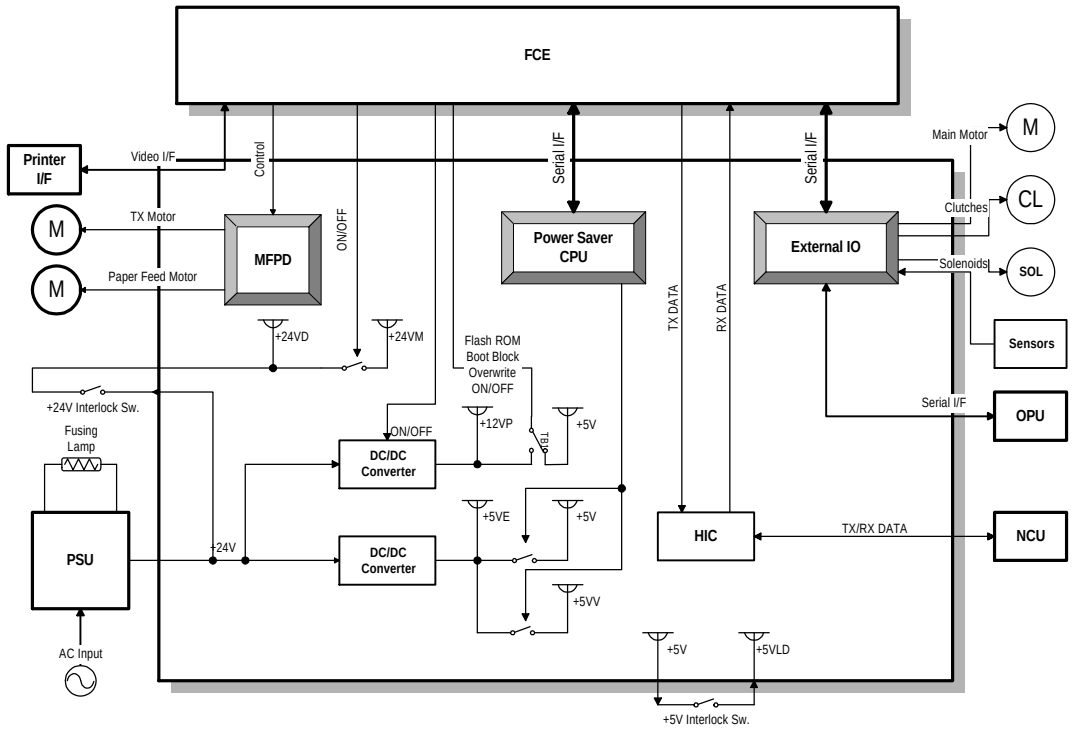
6. Oscillators

- 29.952 MHz oscillator for system clock generation.
- 32.768 MHz oscillator for the real time clock. This is backed up by the battery on the FCE.

7. Jumpers, Switches, and Test Points

Item	Description
SW1	Switches the backup battery ON/OFF

2.4.2. FDU



h521d631.wmf

1. Power Saver CPU

- 4 bit CPU for controlling the machine during power saver mode.

2. FPD (Facsimile Power Driver)

- Stepper motor driver.

3. EXIO (External I/O)

- Serial interface to the FCE and OPU.
- Parallel interface to the main motor, clutches, and sensors.

4. HIC (Hybrid IC)

- 2-4 wire switching
- Filters and amplifiers
- Monitor speaker driver

5. DC/DC Converters

- +5V generation
- +12V generation

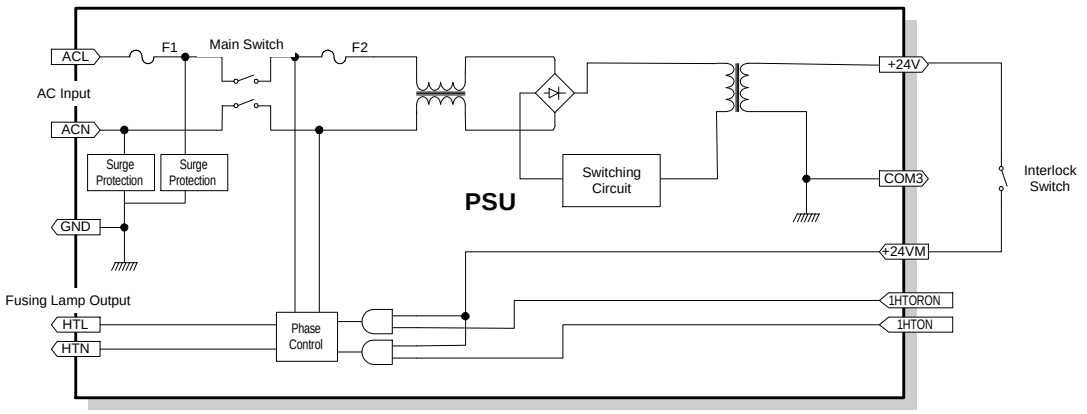
6. Interlock Switches

- The fusing unit interlock switch (+24V) disables the power supply to the drive components and the power pack.
- The fusing unit interlock switch (+5V) disables the power supply to the laser diode unit.

7. Jumpers, Switches, and Test Points

Item	Description
TP1	COM2 ground
TP2	COM1 ground
TP3	+5VE
TP4	-5V
TP7	Laser synchronization signal
TP6	Scanner clock
TP8	Scanner clock
TP9	Analog video signal input from the Contact Image Sensor
CN40-1	Analog video signal
CN40-2	Scanner clock
CN40-3	Synchronization signal
CN40-4	COM1 ground
TB1	Switches the power supply to the flash ROM boot block on the FCE 1-2 pins shorted: +12V (the boot block can be overwritten) 2-3 pins shorted: +5V (the boot block cannot be overwritten) **Warning: Do not change this jumper setting, unless the boot block in the Flash ROM needs to be overwritten by Function 12.** **(Refer to Chapter 4.1.20 for more details.)**

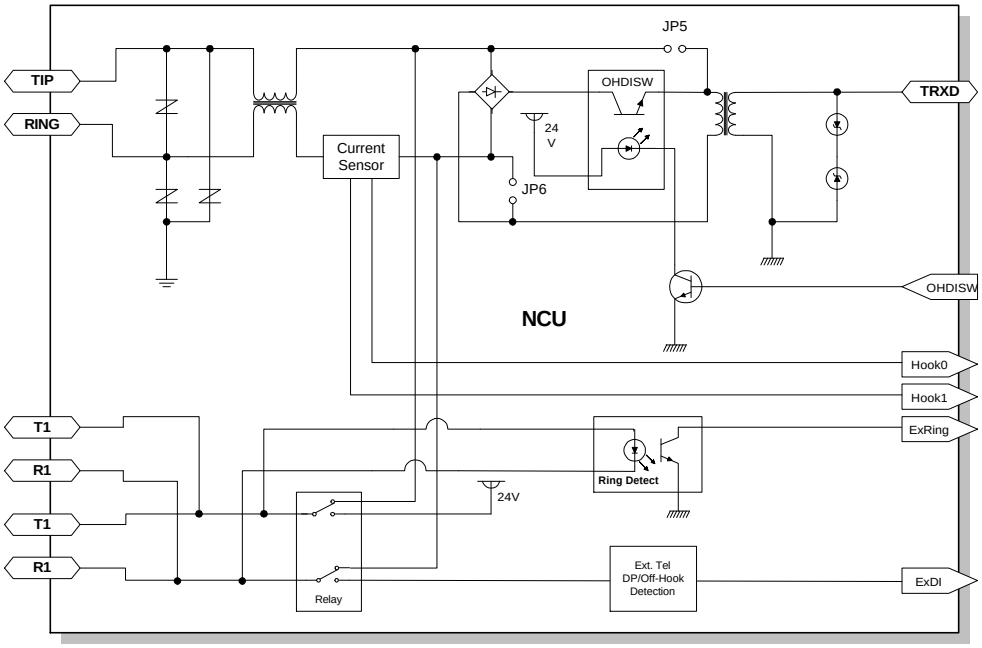
2.4.3. PSU



h521d632.wmf

- +24Vdc generation
- Fusing lamp ac power supply and control.

2.4.4. NCU (USA)

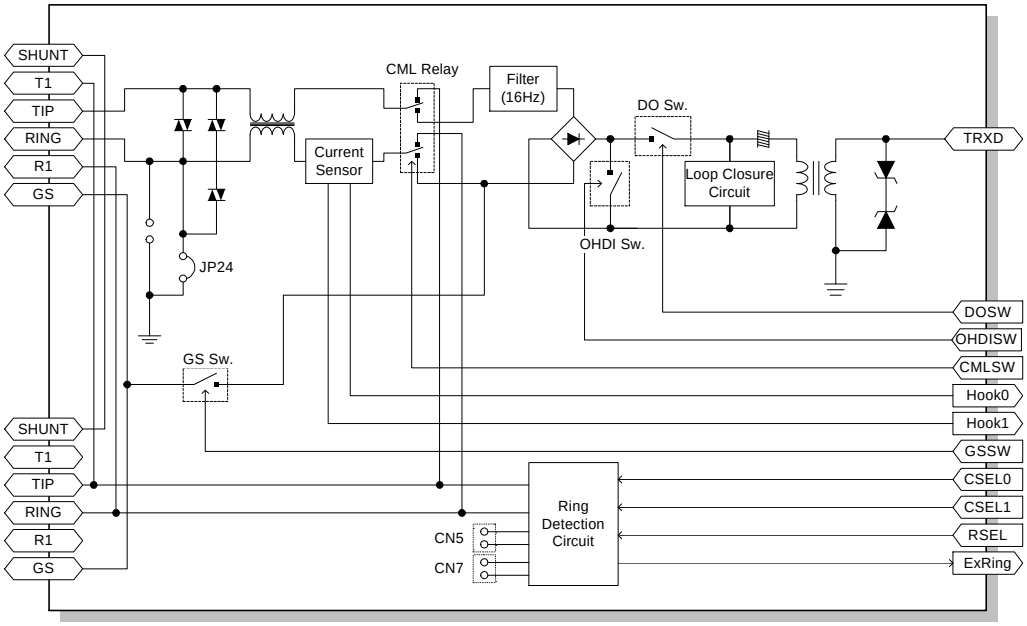


h521d633.wmf

1. Jumpers

Item	Description
JP5	These jumpers should be shorted when the machine is connected to a dry line.
JP6	

2.4.5. NCU (Europe/Asia)



H521D634.WMF

1. Control Signals and Jumpers

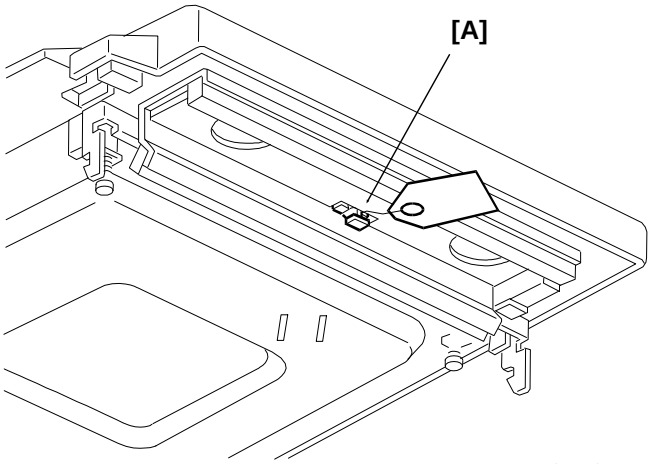
Country	CSEL0 CN2-4	CSEL1 CN2-5	RSEL CN1-13	JP24	CN5	CN7
Germany	L	H	H	S	O	O
Holland	L	H	H	S	O	O
Austria	L	H	H	S	O	O
Italy	L	L	L	S	O	O
Spain	L	L	L	S	O	O
Ireland	H	L	L	S	S	S
Finland	L	H	L	O	O	O
Switzerland	L	H	L	O	O	O
Other	L	H	L	S	O	O
	L: Low, H: High			**S: Short, O: Open**		

3. INSTALLATION

3.1. INSTALLING THE MACHINE

Refer to the Operator's Manual for the installation environment and how to install and set up the machine.

Note: The red clip [A] (P/N H5211161) prevents the scanner from moving during transportation. This clip has to be removed at installation, and it has to be installed again before transportation.



H521I501.wmf

Refer to section 2.4.5 for how to set up the NCU hardware in each country.

3.2. INITIAL PROGRAMMING

Items to Program (Service Level)	Function No.
Country code (NCU parameter 00)	Function 08
Country code (System switch 0F)	Function 01
Protocol requirements (G3 switch 0B)	Function 01
PABX access code (RAM address 8000BB)	Function 06
Machine's serial number	Function 14
Service station's fax number	Function 13
PM call (System switch 01 - bit 0)	Function 01
Periodic service call (RAM address 800256)	Function 06

Items to Program (User Administrator Level)	Function No.
Clock	Function 91
Initial programming items (IDs)	Function 61
On/off switches	Function 62
Display/report language	Function 93
PABX access method (User parameter switch 13 - bits 0, 1)	Function 63
Fusing power control during power saver mode (User parameter switch 05 - bit 6)	Function 63

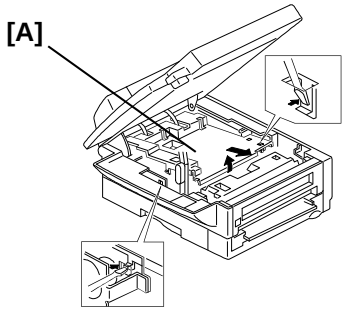
3.3. OPTIONAL UNITS

⚠CAUTION

Before installing an optional unit, do the following.
1. Print out all the messages stored in the memory.
2. Print out the lists of user programmed items and the system parameter list.
3. Turn off the main switch, and disconnect the power plug.

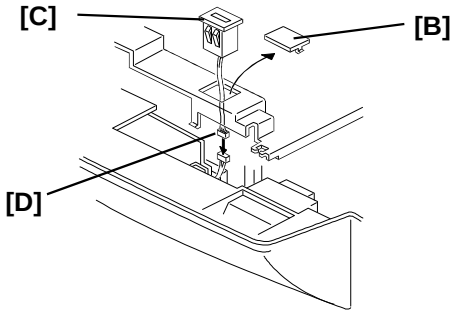
3.3.1. Counter

H165i501.wmf



Remove the inner cover [A].

H165i502.wmf



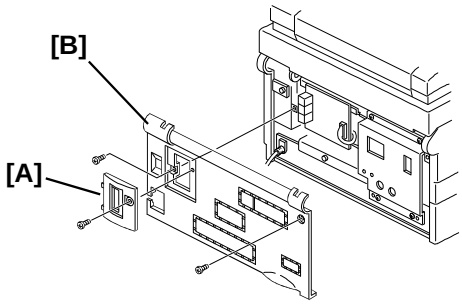
Remove the small cover [B] from the inner cover, and install the counter [C].

Connect the harness [D] to the FDU, then put back the inner cover [A].

Plug in the machine and turn on the main switch.

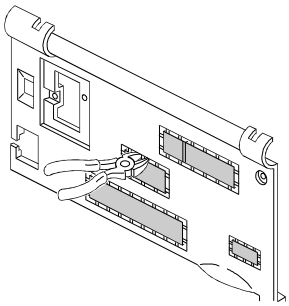
Make some copies and check if the counter works. If it does not, check the connection from the counter to the FDU.

3.3.2. Printer Interface



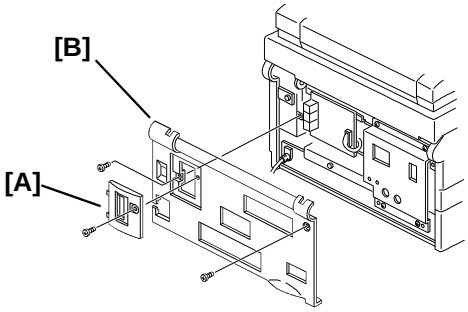
H144i501.wmf

Remove the NCU cover [A] (1 screw) and the left cover [B] (2 screws).



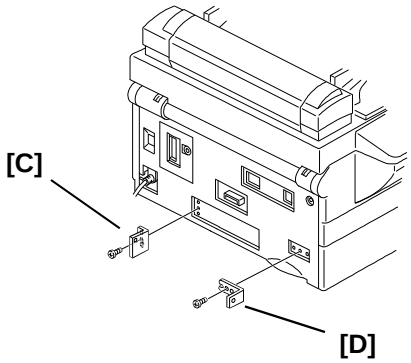
H144i502.wmf

Cut off the shaded parts of the left cover.



H144i504.wmf

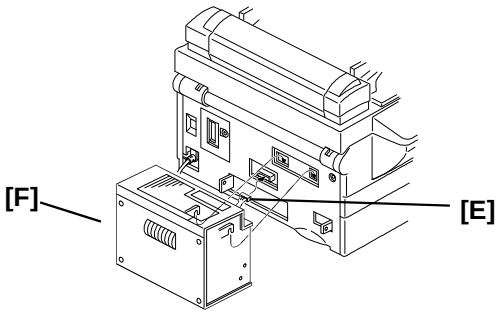
Put back the left cover [B] (2 screws) and the NCU cover [A] (1 screw).



H144i503.wmf

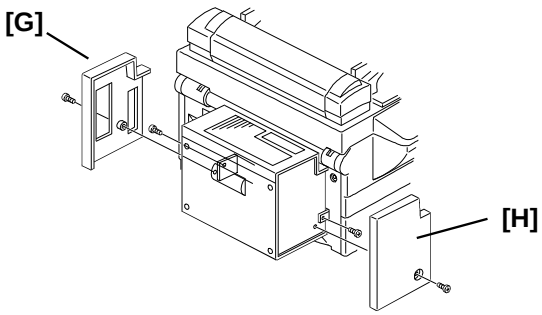
Install two brackets [C] and [D] (1 screw each).

H144i505.wmf



Connect the harness [E] to the FDU, and hook up the printer interface unit [F] to the machine.

H144i506.wmf



Secure the unit with two screws, and install the side covers [G] and [H].

After installing the interface unit, do the following:

- Connect a printer cable (parallel cable) from the machine to a PC.
- Plug in the machine and turn on the main switch.
- Check if the On Line indicator on the operation panel is lit or not. If it is not, check the harness connection from the printer interface unit to the FDU.
- Enter user function 36 and print a setup sheet or a test pattern to check the controller. (Refer to the Operation Manual for the procedures.)
- Print a page from the PC to check the parallel interface.

4. SERVICE TABLES AND PROCEDURES

4.1. SERVICE LEVEL FUNCTIONS

In this section, frequently used keys are referred to with the following symbols.
- Start key
- Stop key
- [Function] - Function key
- [Yes] - Yes key
- [No] - No key
- Up arrow key
- Down arrow key
- Right arrow key
- Left arrow key

4.1.1. Bit Switch Programming (Function 01)

1. [Function] [6] [1] [9] [9] [5] then immediately [Yes]

```
FUNCTION    KPAD/NEXT
   SERVICE FUNCTIONS
```

2. [0] [1] [Yes]

```
SYS DF    :   0000 0000
BITSW 00:     0000 0000
```

Bit 7 is displayed at the left, and bit 0 at the right.

3. Scroll through the bit switch menu: [*] or [#]

```
SYS DF   :    0000 0000
BITSW03:      0000 0000
```

Example: To see the communication bit switches : [#] × 3
Scroll through the bit switches:
Increment bit switch:
Decrement bit switch:
Example: Display bit switch 3: x 3

4. Adjust the bit switch.

Example: To change the value of bit 7, press [7]

```
SYS DF   :    0000 0000
BITSW03:      1000 0000
```

5. Either:
   - Adjust more bit switches - go to step 3.
   - Finish - Function

4.1.2. System Parameter List (Function 02)

1. Function 6 1 9 9 5 then immediately Yes

```
FUNCTION    KPAD/NEXT
    SERVICE FUNCTIONS
```

2. 0 2 Yes ◇
3. Finish: Function

4.1.3. Error Code Display (Function 03)

1. Function 6 1 9 9 5 , then immediately Yes

```
FUNCTION    KPAD/NEXT
   SERVICE FUNCTIONS
```

2. 0 3 Yes

```
ERROR CODE      <>
 1-01  JAN 01 17:30
```

3. Either:
   Scroll through the error codes - ▶ or ◀
   Finish - Function

4.1.4. Service Monitor Report (Function 04)

1. Function 6 1 9 9 5 then immediately Yes

```
FUNCTION    KPAD/NEXT
   SERVICE FUNCTIONS
```

2. 0 4 Yes ◇
3. Finish: Function

4.1.5. Protocol Dump (Function 05)

1. Function 6 1 9 9 5 then immediately Yes

```
FUNCTION    KPAD/NEXT
   SERVICE  FUNCTIONS
```

2. 0 5 Yes

```
                    START
PROTOCOL  DUMP
```

3. ◈

4. Finish: Function

4.1.6. RAM Display/Rewrite (Function 06)

1. Function 6 1 9 9 5 then immediately Yes

```
FUNCTION    KPAD/NEXT
   SERVICE  FUNCTIONS
```

2. 0 6 Yes

```
0-MEM.R/W 1-MEM.DUMP
```

3. 0

```
 ADDRESS = 000000
  DATA     = 00
```

4. Input the address that you wish to see.
   Example: Address 800020
   8 0 0 0 2 0

```
 ADDRESS = 202020
  DATA = 20
```

   Note: To move the cursor, press ▶

5. If you wish to change the data, type in the new data.
   Example: 80, press 8 0
   Note: If you wish to move the cursor, press ▶

```
 ADDRESS = 202020
  DATA = 80
```

6. Either:
   - View more addresses - go to step 4.
   - Finish - Function

4.1.7. RAM Dump (Function 06)

1. Function 6 1 9 9 5 then immediately Yes

```
FUNCTION    KPAD/NEXT
 SERVICE  FUNCTIONS
```

2. 0 6 Yes

```
0-MEM.R/W 1-MEM.DUMP
```

3. 1

```
MEMORY DUMP   START/N
ADD.000000 -  0000FF
```

4. Enter the first four digits of the start and end addresses . For example, enter “8000” for start address 800000(H), and enter 8001 for end address 8001FF(H). Then, press "Start" to print the dump list.

```
MEMORY DUMP  START/N
ADD. 800000-  8001FF
```

   Example: Start at 800000, end at 8001FF.
   8 0 0 0 8 0 0 1 ◇ .

```
MEMORY DUMP
```

5. Finish: Function

4.1.8. Counter Display/Rewrite (Function 07)

1. Function 6 1 9 9 5
   then immediately Yes

```
FUNCTION    KPAD/NEXT
   SERVICE  FUNCTIONS
```

2. 0 7 Yes

```
0-COUNTER      1-PM
 2-CTM              3-OPU
```

3. Either
   Check the scanned, printed, transmitted, and received page counters, and the printer and scanner jam- press 0

```
TX:          012345
RX:          012345
```

(To see the transmitted and received page counters, press [#].

```
SCAN     :    012345
PRINT    :    012345
```

To see the printer and scanner jam counters, then press [#] again.)

```
S.JAM:        000000
P.JAM:        000000
```

Check the PM counter - press [1]

```
PM COUNTER:  001234
```

Check the CTM counter - press [2]

```
CTM COUNTER: 001234
```

Check the OPU counter - press [3]

```
OPU COUNTER:      001234
```

4. To change the contents of a counter, input the new value, then press [Yes]
5. To finish: [Function]

4.1.9. NCU Parameters (Function 08)

1. [Function] [6] [1] [9] [9] [5] then immediately [Yes]

```
FUNCTION    KPAD/NEXT
   SERVICE  FUNCTIONS
```

2. [0] [8] [Yes]
3. [0]

```
0-NCU           1-MODEM
2-DTMF          3-DETCT
```

4. Scroll through the parameters using [▶] or [◀] . If you want to change a value, enter the new value at the keypad, then press [Yes]

```
NCU                KPAD/<>
    NO.04 = 005
```

Example: Set NCU parameter 04 to 005.
[▶][▶][▶][▶] [0] [0] [5] [Yes]

5. To finish : [No] [Function].

Note: Parameter CC is the Country Code, Parameter 01 is the Tx Level. Refer to section 4.3 for full details on NCU parameters.

4.1.10. Modem Test (Function 08)

1. Function 6 1 9 9 5
   then immediately Yes

```
FUNCTION    KPAD/NEXT
   SERVICE  FUNCTIONS
```

2. 0 8 Yes

```
0-NCU          1-MODEM
 2-DTMF         3-DETECT
```

3. 1

```
MODEM TEST START/<>
 V17   14400BPS
```

4. Scroll through the available tests using ▶ or ◀
5. ◇
6. To stop the test: ▽
7. To finish: No Function

4.1.11. DTMF Tone Test (Function 08)

1. Function 6 1 9 9 5
   then immediately Yes

```
FUNCTION    KPAD/NEXT
   SERVICE  FUNCTIONS
```

2. 0 8 Yes

```
0-NCU       1-MODEM
 2-DTMF      3-DETECT
```

3. 2

```
 DTMF TEST   START/<>
  TONE   0
```

4. Scroll through the available tests using ▶ or ◀
5. ◇
6. To stop the test: ▽
7. To finish: No Function

4.1.12. Modem Detection Test (Function 08)

Note: This function can be used only when G3 bit switch 0B bit 5 (French PTT requirements) is 1 in European models. It cannot be used in USA models.

1. Function 6 1 9 9 5
   then immediately Yes

```
FUNCTION    KPAD/NEXT
   SERVICE  FUNCTIONS
```

2. 0 8 Yes

```
0-NCU       1-MODEM
 2-DTMF      3-DETECT
```

3. 3

```
 MODEM DET   START/<>
  V21 300BPS
```

4. Scroll through the available tests using ▶ or ◀
5. ◇
6. To stop the test: ▽
7. To finish: No Function

4.1.13. Ringer Test (Function 08)

1. Function 6 1 9 9 5
   then immediately Yes

```
FUNCTION    KPAD/NEXT
   SERVICE  FUNCTIONS
```

2. 0 8 Yes

```
0-NCU       1-MODEM
 2-DTMF      3-DETECT
```

3. 4

```
                  START
  RINGER
```

5. ◇
6. To stop : ▽
7. To finish: No Function

4.1.14. Operation Panel Test (Function 09)

1. Function 6 1 9 9 5
   then immediately Yes

```
FUNCTION    KPAD/NEXT
   SERVICE  FUNCTIONS
```

2. 0 9 Yes

```
0-LED/LCD
```

3. 0
4. ◇
5. To stop the test, press ▽
6. To finish: No Function

4.1.15. LED Array Test (Function 10)

1. Function 6 1 9 9 5
   then immediately Yes

```
FUNCTION      KPAD/NEXT
   SERVICE  FUNCTIONS
```

2. 1 0 Yes

```
0-LAMP       1-ADF
2-BOOK       3-SELECT
```

3. 0
4. ◇

```
                  START
LAMP          000
```

   The LED array and fusing lamp both turn on. The video peak level detected by the image sensor is displayed on the bottom line.

5. To stop the test: ▽
6. To finish: No Function

4.1.16. ADF Test (Function 10)

1. Function 6 1 9 9 5
   then immediately Yes

```
FUNCTION    KPAD/NEXT
   SERVICE  FUNCTIONS
```

2. 1 0 Yes

```
0-LAMP       1-ADF
2-BOOK       3-SELECT
```

3. 1

```
                  START
 ADF
```

4. Place a document in the feeder,
   then press ◇.
   All sheets in the ADF will be fed.
5. To stop the test: ▽
6. Finish: No Function

4.1.17. Book Mode Scanner Mechanism Test (Function 10)

1. Function 6 1 9 9 5
   then immediately Yes

```
FUNCTION      KPAD/NEXT
   SERVICE  FUNCTIONS
```

2. 1 0 Yes

```
0-LAMP       1-ADF
2-BOOK       3-SELECT
```

3. 2

```
                  START
 BOOK
```

4. Press ◇ .
   One book mode scan cycle is performed, then the machine stops.
   If you wish to stop the test before this, press ▽ .
5. Finish: No Function

4.1.18. Auto Paper Select Mode Test (Function 10)

1. [Function] [6] [1] [9] [9] [5]
   then immediately [Yes]

```
FUNCTION    KPAD/NEXT
   SERVICE  FUNCTIONS
```

2. [1] [0] [Yes]

```
0-LAMP       1-ADF
2-BOOK       3-SELECT
```

3. [3]

```
                    START
 APS
```

4. Press [◇] .

```
                    STOP
APS    00000100
```

The current output of the document size sensors is displayed.
- First four digits: Not used
- 5th digit: W1
- 6th digit: W2
- 7th digit: L1
- 8th digit: L2

See "Original Detection" (section 2.1.2) for the functions of W1, W2, L1, and L2.

5. To stop the test: [▽]
6. Finish: [No] [Function]

4.1.19. Image Sensor Signal Check/Sampling Clock Reset (Function 10)

1. [Function] [6] [1] [9] [9] [5]
   then immediately [Yes]

```
FUNCTION    KPAD/NEXT
   SERVICE  FUNCTIONS
```

2. [1] [0] [Yes]

```
0-LAMP       1-ADF
2-BOOK       3-SELECT
```

3. [4]

```
                    START
 VIDEO
```

4. Press [Start] .

```
                    STOP
VIDEO   AAA   BBB   CDE
```

Five numbers are displayed on the bottom line of the LCD.

- AAA: Sensor output while the lamp is on. This should be between 160 and 225.
- BBB: Sensor output while the lamp is off. This should be between 8 and 28.
- C: Not used.
- D: Result

Result	Error Details	Possible Cause
0	OK	
1	BBB was out of the specified range	The image sensor is defective.
2	AAA was out of the specified range	The image sensor, Xe lamp, FCE, or FDU is defective.
3	Both A and B were out of the specified range.	

- E: Selected clock (from 0 to 7)

5. To stop the test: [Stop]
6. Finish: [No] [Function]

4.1.20. Printer Test Patterns (Function 11)

1. [Function] [6] [1] [9] [9] [5]
   then immediately [Yes]

```
FUNCTION   KPAD/NEXT
   SERVICE FUNCTIONS
```

2. [1] [1] [Yes]

```
0-PATTERN   1-MECH
2-RAM
```

3. [0]

```
PATTERN PRINT   KPAD
    0-4
```

5. Press a key from [0] to [4].
6. Press [Start] .
   A test pattern is printed.
7. To finish: [No] [Function]

4.1.21. Printer Mechanism Test - Free Run (Function 11)

1. Function 6 1 9 9 5
   then immediately Yes

```
FUNCTION    KPAD/NEXT
   SERVICE  FUNCTIONS
```

2. 1 1 Yes

```
0-PATTERN   1-MECH
```

3. 1

```
                    START
 MECH
```

4. ◇

5. To stop the test, press ▽.

6. To finish: No Function

4.1.22. RAM Tests (Function 12)

1. Function 6 1 9 9 5
   then immediately Yes

```
FUNCTION    KPAD/NEXT
   SERVICE  FUNCTIONS
```

2. 1 2 Yes

```
0-SRAM          1-SAF
2-SAFCARD       3-M->R
```

3. Either:

   Test the SRAM: Press 0 ◇.
   Test the SAF: Press 1 ◇.
   Test the IC card: Press 2 ◇.

   If the test is successful, the display shows "OK".
   If the test is not successful, the display shows "ADDRESS =" and the defective memory address.

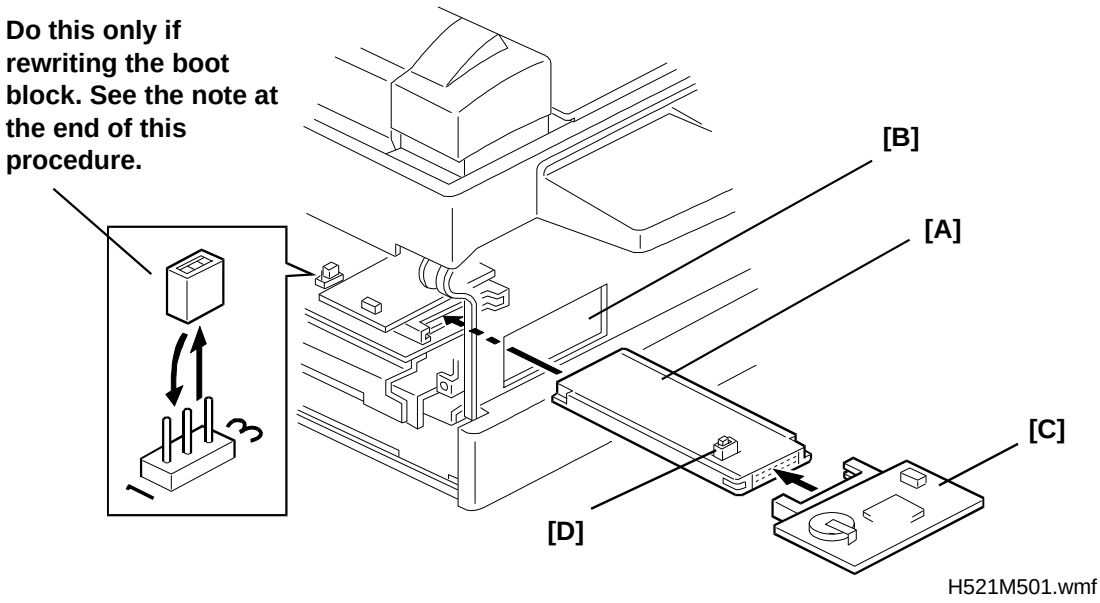
4. To finish: No Function

4.1.23. Software Download (Function 12)

Instead of replacing an EPROM to update the machine's software, use this procedure to update the software in the machine's Flash ROM.

This function copies new software from an external medium to the Flash ROM on the machine's FCE. The external medium for new software can be an FCE or an EPROM board.

1. Turn off the machine, remove the NCU cover, the left cover, and the front cover, then remove the IC page memory card from the FCE.



H521M501.wmf

2. Insert the Flash/SRAM Copy Tool [A] into the IC card slot [B], then connect the FCE or EPROM board with new software [C] to the opposite side of the tool.

   Note: The switch [D] on the tool [A] must be at the **ON** position.

3. Turn on the machine.
4. Function 6 1 9 9 5
   then immediately Yes

```
FUNCTION    KPAD/NEXT
   SERVICE  FUNCTIONS
```

5. 1 2 Yes

```
0-SRAM          1-SAF
2-SAFCARD       3-M->R
```

6. 4

7.
   If the software is successfully downloaded, the display shows "**OK**".

```
OK!!
COPY    MACH <- FLROM
```

   If the software download fails, the display shows "**NG**".

```
NG!!
COPY    MACH <- FLROM
```

8. To finish, Function.
9. Turn off the machine, put the IC card back in the card slot on the FCE, then turn the machine back on.
10. Print out the system parameter list and check the ROM version on it.

Note: In rare cases, the boot block will have to be rewritten. In such cases, you must do the following in addition to the above procedure.

- Before step 1, change the jumper at TB1 on the FDU as shown in the diagram on the previous page.
- After step 3, set bit 5 of system switch 02 to 1.
- Before switching on the machine again in step 9, put TB1 back to the default position (2-3 pins shorted).

11. Put back the front, left, and NCU covers.

⚠CAUTION

If the IC card is missing, the machine will only be able to make partial copies of each original because of a lack of page memory.

4.1.24. Software Upload (Function 12)

This function copies the software from the machine's built-in FCE to an external FCE.

1. Turn off the machine, remove the NCU, left, and front covers, then remove the IC card from the FCE.
2. Connect the Flash/SRAM Copy Tool and an FCE as shown in the previous section.

   Note: The switch [D] on the tool must be at the OFF position.

3. Turn on the machine.

4. Function 6 1 9 9 5
   then immediately Yes

```
FUNCTION    KPAD/NEXT
   SERVICE  FUNCTIONS
```

5. 1 2 Yes

```
0-SRAM          1-SAF
2-SAFCARD       3-M->R
```

6. 3
   If the software is successfully uploaded, the display shows "**OK**".

```
OK!!
COPY    MACH -> FLROM
```

   If the software upload fails, the display shows "**NG**".

```
NG!!
COPY    MACH -> FLROM
```

7. Finish : Function

8. Turn off the machine, put back the IC card and covers, and turn on again.

⚠CAUTION

If the IC card is missing, the machine will only be able to make partial copies of each original because of a lack of page memory.

4.1.25. SRAM Data Download (Function 12)

This function copies all the data stored in the SRAM on an external FCE to the machine's FCE. Use this after replacing a damaged FCE to save any previous settings that were programmed in the damaged FCE.

1. Turn off the machine.
2. Connect the Flash/SRAM Copy Tool [A] and the damaged FCE [C] as shown in section 4.1.22.

   Note: The setting of switch [D] on the tool will not affect the result of this procedure.

3. Turn on the machine.
4. Function 6 1 9 9 5
   then immediately Yes

```
FUNCTION    KPAD/NEXT
   SERVICE  FUNCTIONS
```

5. 1 2 Yes

```
0-SRAM          1-SAF
2-SAFCARD       3-M->R
```

6. 5
7. ◇
   If the SRAM data is successfully down-loaded, the display shows "**OK**".

```
OK!!
COPY    MACH <- SRAM
```

   If the download fails, the display shows "**NG**".

```
NG!!
COPY    MACH <- SRAM
```

8. Finish : Function
9. Turn off the machine, put back the IC card and the covers, then turn it back on.

⚠CAUTION

If the IC card is missing, the machine will only be able to make partial copies of each original because of a lack of page memory.

4.1.26. Serial Number (Function 14)

1. Function 6 1 9 9 5
   then immediately Yes

```
FUNCTION    KPAD/NEXT
   SERVICE FUNCTIONS
```

2. 1 4 Yes

```
SERIAL #         KPAD
  ■■■■■■■■■■■■
```

3. Enter the machine's serial number at the keypad.
   To correct a mistake: No

```
SERIAL #    KPAD/Y/N
 7940479186
```

4. If the display is correct: Yes
5. Finish: Function

4.1.27. Service Station Telephone Number (Function 13)

1. Function 6 1 9 9 5
   then immediately Yes

```
FUNCTION    KPAD/NEXT
   SERVICE  FUNCTIONS
```

2. 1 3 Yes

```
S.S. NO.          KPAD
 _
```

3. Input the telephone number of the service station that will receive Auto Service calls from this machine.

   To clear the telephone number: press No

```
S.S. NO.          KPAD
 2125555242
```

4. If the display is correct: Yes Function

4.2. BIT SWITCHES

⚠WARNING

Do not adjust a bit switch that is described as "Not used", as this may cause the machine to malfunction or to operate in a manner that is not accepted by local regulations. Such bits are for use only in other areas, such as Japan.

Note: Default settings for bit switches are not listed in this manual. Refer to the System Parameter List printed by the machine.

4.2.1. System Switches

System Switch 00

No	FUNCTION	COMMENTS
0 1	RAM Reset **Bit 1 Bit 0 Reset Level** 0 0 No reset 0 1 Reset Level 2 1 0 Reset Level 3 1 1 Not used	**Reset Level 3:** Erases all image data files stored in the SAF memory and communication files (e.g., polling rx files). This setting is recommended for use when it is necessary to clear the SAF. **Reset Level 2:** In addition to those items erased by Reset Level 3, the following items are erased: own telephone number, bit switches, RTI/TTI/CSI, Report data, programmed telephone numbers (Quick/Speed/ Groups, service station, etc.), NCU parameters, personal codes. After erasing, the machine changes these two bits back to 0 automatically. **No reset:** Normal operation **Cross reference** **RAM Reset Level 1 (Factory reset):** Change the data in RAM address 800000(H) to FF(H), then turn the machine off and on. In addition to those items erased by Reset Level 2, the clock, scan/print registration settings, printing density settings, and video processing parameters are erased.

System Switch 00		
No	**FUNCTION**	**COMMENTS**
2	Technical data printout on TCR (Journal) **0:** Disabled **1:** Enabled	1: Instead of the personal code, the following data are listed on the TCR for each analog G3 communication. e.g. V.29 14 01 03 00 02 **First number:** Final modem type used **Second number:** Final modem rate (for example, 14 means 14.4 kbps) **Third and fourth numbers:** Line quality data. Either a measure of the error rate or the rx level is printed, depending on the bit 3 setting below. (An M on the report indicates that it is an error rate, and an L indicates an Rx level.) The left hand figure is the high byte and the right hand figure is the low byte (refer to the note below this table for how to read the rx level). If it is a measure of the error rate, a larger number means more errors. **Fifth number (rx mode only):** Total number of error lines that occurred during non-ECM reception. **Sixth number (rx mode only):** Total number of burst error lines that occurred during non-ECM reception. The fifth and sixth numbers are fixed at 00 for transmission records and ECM reception records.
3	Line quality data output method **0:** Measure of error rate (during image data transmission only) **1:** Rx level	This bit determines the data type to be printed on the TCR (Journal) when technical data printout is enabled by bit 2 above.
4	Line error marks **0:** Disabled **1:** Enabled	If this bit is 1, a mark will be printed on the left edge of the page at any place where a line error occured in the data. Such errors are caused by a noisy line, for example.
5	Communication parameter display **0:** Disabled **1:** Enabled	This is a fault-finding aid. The LCD shows the key parameters (see the next page). This is normally disabled because it cancels the CSI display for the user. Be sure to reset this bit to 0 after testing.
6	Protocol dump list output after each communication **0:** Off **1:** On	This is only used for communication troubleshooting. It shows the content of the transmitted facsimile protocol signals. Always reset this bit to 0 after finishing testing.
7	Not used.	Do not change the settings.

How to calculate the rx level listed on the TCR (when bit 2 of system switch 00 is set to 1)

Example: V29 96 **L 01 0C** 00 00

The four-digit hexadecimal value (N) after L indicates the rx level. Divide the decimal value of N by -16 to get the rx level.

In this example, the decimal value of 010C(H) is 268.
So, the actual rx level is 268/16 = -16.75 dB.

Communication Parameters

Mode	DCS: ITU-T standard	NSS: Non-standard G3
Modem rate	96: 9600 bps 72: 7200 bps 48: 4800 bps 24: 2400 bps	
Communication mode	ECM: With ECM EFC: Using EFC	SSC: Using SSC NML: With no ECM, SSC, or EFC
Compression mode	MMR: MMR compression MR: MR compression MH: MH compression	
Resolution	SSF: Fine, transmitted at 8 x 15.4 dots per mm DTL: Detail, transmitted at 8 x 7.7 dots per mm STD: Standard, transmitted at 8 x 3.85 dots per mm	
I/O rate	0M: 0 ms/line 2/M: 2.5 ms/line 5M: 5 ms/line	10M: 10 ms/line 20M: 20 ms/line 40M: 40 ms/line
Width and reduction	=A4: A4 (8.3"), no reduction =B4: B4 (10.1"), no reduction >A4: Reduced to A4 (8.3") before transmission	

System Switch 01		
No	**FUNCTION**	**COMMENTS**
0	PM call **0:** Disabled **1:** Enabled	This bit switch determines whether the machine will send an Auto Service Call to the service station when it is time for PM. Cross reference Auto service calls: Section 2.3.2
1 to 7	Not used	Do not change the settings.

System Switch 02		
No	**FUNCTION**	**COMMENTS**
0	Memory file transfer **0:** Disabled **1:** Enabled	**1:** All messages in the memory (including confidential rx messages) are sent to the fax number which is programmed as the service station. Always reset this bit to zero after transfer. **Cross reference** Service station number programming: Function 13
1	Programmed data transfer (Back-to-back) **0:** Disabled **1:** Enabled	Do the following steps to transfer the data. 1. Connect two machines of the same type back to back and enable back-to-back communication on both machines. (For this machine, set bit 7 of the G3 bit switch 00 to 1.) 2. Set this switch to 1 on the receiving machine. 3. Insert a sheet of paper in the ADF, and press Start on both machines. The data is transferred. 4. Disable back-to-back comminication and set this bit to 0 after finishing.
2	Not used	Do not change the setting.
3	Memory file printout **0:** Disabled **1:** Enabled	**1:** All SAF files, including confidential messages, can be printed using Function 51. Always reset this bit after printing the messages.
4	Not used	Do not change the settings.
5	Software download area **0:** All except the boot block **1:** All areas, including the boot block Keep this bit at 0 except for the rare cases when the Flash ROM boot block has to be rewritten.	**0:** This is the normal setting. For normal software downloads, do not change this bit switch. **1:** Set this bit to 1 only when you need to rewrite the boot block in the Flash ROM using Function 12. **Cross reference** Software Download: Section 4.1.20
6 **7**	Memory read/write by RDS **Bit 4 3 Setting** 0 0 Always disabled 0 1 User selectable 1 0 User selectable 1 1 Always enabled	**(0,0):** All RDS systems are always locked out. **(0,1), (1,0):** Normally, RDS systems are locked out, but the user can temporarily switch RDS on to allow RDS operations to take place. RDS will automatically be locked out again after a certain time, which is stored in System Switch 03 (see below). Note that if an RDS operation takes place, RDS will not switch off until this time limit has expired. **(1,1):** At any time, an RDS system can access the machine.

System Switch 03		
No	**FUNCTION**	**COMMENTS**
0 **to** **7**	Length of time that RDS is temporarily switched on when bits 6 and 7 of System Switch 02 are set to "User selectable"	00 - 99 hours (BCD). This data is only valid if bits 6 and 7 of System Switch 02 are set to "User selectable".

System Switch 04		
No	**FUNCTION**	**COMMENTS**
0 **1** **2**	LCD contrast **Bit 2 1 0 Contrast** 0 0 0 Brightest 0 0 1 ↓ ↓ ↓ 1 1 0 ↓ 1 1 1 Darkest	Use these bit switches to adjust the contrast of the LCD on the operation panel.
3	Dedicated transmission parameter programming **0:** Disabled **1:** Enabled	This bit must be set to 1 before changing any dedicated transmission parameters
4	Not used	Do not change the factory setting.
5	OPC (master drum) replacement level **0:** User **1:** Service	**0:** The machine asks the user to replace the OPC drum at 30,000 print intervals (default interval). After the user replaces the drum, the machine asks the user if the drum is replaced or not. If the user answers yes, the machine resets the OPC counter to zero. The drum replacement interval is programmed at addresses 8001E5 to 8001E7(H). Refer to section 4.5 for more details. **1:** The machine will not ask the user to replace the drum.
6	CSI programming level **0:** User level **1:** Service level	**1:** The CSI can only be programmed using a service function.
7	Telephone line type programming mode **0:** User level **1:** Service level	**1:** Telephone line type can only be selected with a service function.

System Switch 05		
No	**FUNCTION**	**COMMENTS**
0 **1**	Not used	Do not change the settings.
2	Display of both RTI and CSI on the LCD **0:** Disabled **1:** Enabled	**1:** Both RTI and CSI will be displayed alternately on the LCD.

System Switch 05		
No	**FUNCTION**	**COMMENTS**
3 to 7	Not used	Do not change the settings.

System Switch 06		
No	**FUNCTION**	**COMMENTS**
0	Use of the Stop key during memory transmission **0:** Disabled **1:** Enabled	**1:** Memory transmissions can be stopped by pressing the Stop key. However, users might accidentally cancel another person's memory transmission in progress.
1 to 7	Not used	Do not change the settings.

System Switch 07 - Not used (do not change the factory settings)
System Switch 08 - Not used (do not change the factory settings)

System Switch 09		
No	**FUNCTION**	**COMMENTS**
0	Not used	Do not change the factory settings.
1	Inclusion of communications on the TCR when no image data was exchanged. **0:** Disabled **1:** Enabled	0: Communications which reached phase C (message tx/rx) of the T.30 protocol are listed on the TCR (Journal). **1:** Communications which reached phase A (call setup) of T.30 protocol are listed on the TCR (Journal). This will include telephone calls.
2	Automatic error report printout **0:** Disabled **1:** Enabled	**0:** Error reports will not be printed. **1:** Error reports will be printed automatically after failed communications.
3	Printing of the error code on the error report **0:** No **1:** Yes	**1:** Error codes are printed on the error reports.
4	Not used	Do not change the factory settings.
5	Power failure report **0:** Disabled **1:** Enabled	**1:** A power failure report will be automatically printed after the power is switched on if a fax message disappeared from the memory when the power was turned off last.
6	Not used	Do not change the settings.
7	Priority given to various types of remote terminal ID when printing reports **0:** RTI > CSI > Dial label > Tel. number **1:** Dial label > Tel. number > RTI > CSI	This bit determines which set of priorities the machine uses when listing remote terminal names on reports. Dial Label: The name stored with the Quick/Speed Dial number by the user.

System Switch 0A		
No	**FUNCTION**	**COMMENTS**
0 to 3	Not used	Do not change the settings.
4	Dialing on the ten-key pad when the handset is off-hook **0:** Disabled **1:** Enabled	**1:** The user can dial on the machine's ten-key pad when the handset is off-hook.
5	On hook dial **0:** Disabled **1:** Enabled	**0:** On hook dial is disabled.
6	Not used	Do not change the settings.
7		

System Switch 0B		
No	**FUNCTION**	**COMMENTS**
0 **1**	Automatic reset timer **Bit 1 Bit 0 Timer setting** 0 0 1 minute 0 1 3 minutes 1 0 5 minutes 1 1 No limit	**(1, 1):** Automatic reset is disabled. **(Other):** The machine returns to the standby mode when the timer expires after the last operation.
2 **3**	Power Saver mode timer **Bit 3 Bit 2 Time Limit** 0 0 1 minute 0 1 3 minutes 1 0 5 minutes 1 1 No limit	**(1, 1):** Automatic Power Saver mode is disabled. **(Other):** The machine goes into a Power Saver mode when the timer expires after the last operation. **Cross reference** Power Saver modes: Section 2.3.1
4 to 7	Not used	Do not change the settings.

System Switch 0C		
No	**FUNCTION**	**COMMENTS**
0 to 3	Original size groups to be used in ADF size detection. Bit 0 to 2: Not used Bit 3: A4 or Letter	0: A4, 1: Letter
4 to 7	Not used	Do not change the settings.

System Switch 0D		
No	**FUNCTION**	**COMMENTS**
0 to 5	Original size groups to used in book original size detection. (Refer to section 2.1.2 Original Detection for the details.) Bit 0: Not used Bits 1 and 2: Legal/F Bit 3: A4 or Letter Bit 4: A5 lengthwise or size not detected Bit 5: HLT sideways or A5 sideways	Bit 2 Bit 1 Size 0 0 Not used 0 1 Legal 1 0 F 1 1 Not used 0: A4, 1: Letter 0: A5 lengthwise (Europe/Asia only) 1: Size not detected 0: A5sideways , 1: HLT sideways
6 7	Not used	Do not change the settings.

System Switch 0E		
No	**FUNCTION**	**COMMENTS**
0	Not used	Do not change the settings.
1	Automatic cassette switchover **0:** Disabled **1:** Enabled	If this is enabled, the machine will automatically switch over to the other cassette if paper runs out, if an optional cassette is installed and the paper is of the same size.
2	Copy count progress display **0:** Count up **1:** Count down	This bit determines how the copy count on the LCD behaves during copying.
3 to 7	Not used	Do not change the settings.

System Switch 0F

No	FUNCTION	COMMENTS
0 to 7	Country code for functional settings (Hex) 00: France 10: Not used 01: Germany 11: USA 02: UK 12: Asia 03: Italy 13: Japan 04: Austria 14: Hong Kong 05: Belgium 15: South Africa 06: Denmark 16: Australia 07: Finland 17: New Zealand 08: Ireland 18: Singapore 09: Norway 19: Malaysia 0A: Sweden 1A: China 0B: Switz. 1B: Taiwan 0C: Portugal 20: Turkey 0D: Holland 0E: Spain 0F: Israel	This country code determines the factory settings of bit switches and RAM addresses. However, it has no effect on the NCU parameter settings and communication parameter RAM addresses. **Cross reference** NCU country code: Function 08, parameter CC

System Switch 10 - Not used (do not change the settings)

System Switch 11 - Not used (do not change the settings)

System Switch 12

No	FUNCTION	COMMENTS
0 to 7	TTI printing position in the main scan direction	08 to 92 (BCD) mm. Enter even numbers only. This setting determines the TTI print start position from the left edge of the paper. If moved across to the right too far, the TTI may be obscured by the file number on the top right of the page.

System Switch 13 - Not used (do not change the settings)

System Switch 14

No	FUNCTION	COMMENTS
0 to 7	Wait time between pages in printer mode (with an optional printer interface unit)	05 to 64 (H) (5 to 100s) - This setting determines the machine's wait time between pages in printer mode.

System Switch 15 - Not used (do not change the settings)
System Switch 16 - Not used (do not change the settings)
System Switch 17 - Not used (do not change the settings)
System Switch 18 - Not used (do not change the settings)
System Switch 19 - Not used (do not change the settings)
System Switch 1A - Not used (do not change the settings)
System Switch 1B - Not used (do not change the settings)
System Switch 1C - Not used (do not change the settings)
System Switch 1D - Not used (do not change the settings)
System Switch 1E - Not used (do not change the settings)
System Switch 1F - Not used (do not change the settings)

4.2.2. Scanner Switches

Scanner Switch 00		
No	**FUNCTION**	**COMMENTS**
0	Not used	Do not change the settings.
1	Not used	Do not change the settings.
2 **3**	Maximum transmittable document length **Bit 3 2 Setting** 0 0 600 mm 0 1 1200 mm 1 0 14 m 1 1 Not used	If the user wants to send very long documents such as well logs, select 14 m or a higher setting.
4	OR processing in immediate tx **0:** Disabled **1:** Enabled	0: The machine scans once every 4 motor steps (Standard), or once every 2 motor steps (Detail), and transmits the line without OR processing. The motor step is always 1/15.4 lines/mm. 1: The machine OR processes the scanned lines as explained in section 2.1.3 - 6 “Sub-scan Resolution Conversion”. Toner may be used up quicker if OR processing is enabled.
5 to 7	Not used	Do not change the settings.

Scanner Switch 01 - Not used (do not change the factory settings).
Scanner Switch 02 - Not used (do not change the factory settings).
Scanner Switch 03 - Not used (do not change the factory settings).
Scanner Switch 04 - Not used (do not change the factory settings).
Scanner Switch 05 - Not used (do not change the factory settings).
Scanner Switch 06 - Not used (do not change the factory settings).
Scanner Switch 07 - Not used (do not change the factory settings).
Scanner Switch 08 - Not used (do not change the factory settings).
Scanner Switch 09 - Not used (do not change the factory settings).
Scanner Switch 0A - Not used (do not change the factory settings).
Scanner Switch 0B - Not used (do not change the factory settings).
Scanner Switch 0C - Not used (do not change the factory settings).
Scanner Switch 0D - Not used (do not change the factory settings).
Scanner Switch 0E - Not used (do not change the factory settings).
Scanner Switch 0F - Not used (do not change the factory settings).

4.2.3. Printer Switches

Printer Switch 00		
No	**FUNCTION**	**COMMENTS**
0	Page separation mark **0:** Disabled **1:** Enabled	**0:** No marks are printed. **1**: If a received page has to be printed out on two sheets, an "x" inside a small box is printed at the bottom right hand corner of the first sheet, and a "2" inside a small box is printed at the top right hand corner of the second sheet. This helps the user to identify pages that have been split up.
1	Repetition of data when the received page is longer than the printer paper **0:** Disabled **1:** Enabled	**0:** The next page continues from where the previous page left off. **1:** The final few mm of the previous page are printed at the top of the next page. See section 2.2.12 for details.
2	Not used	Do not change the settings.
3	Cleaning mode after bypass feed **0:** Disabled **1:** After each page is fed from the bypass feed slot	**0:** Cleaning mode is not done at all if bypass feed is used. **1:** Cleaning mode is done every time after a sheet of paper is fed from the bypass feed slot.
4 to 7	Not used	Do not change the settings.

Printer Switch 01 - Not used (do not change the factory settings).
Printer Switch 02 - Not used (do not change the factory settings).

Printer Switch 03		
No	**FUNCTION**	**COMMENTS**
0	Length reduction of received data **0:** Disabled **1:** Enabled	**0:** Incoming pages are printed without length reduction. **Cross reference** Page separation threshold: Printer Sw. 03, bits 4 to 7. **1:** Incoming pages are reduced in the length direction when printing. **Cross reference** Reduction ratio: Printer Switch 04/05 Page separation and data reduction: section 2.2.12
1 **2** **3**	Not used	Do not change the settings.
4 **to** **7**	Page separation threshold (with reduction disabled in switch 03-0 above) If the incoming page is up to x mm longer than the copy paper, the excess portion will not be printed. If the incoming page is more than x mm longer than the copy paper, the excess portion will be printed on the next page. The value of x is determined by these four bits. Hex value of bits 4 to 7 — x (mm) 0 — 0 1 — 1 and so on until F — 15 **Cross reference** Page separation and data reduction: Section 2.2.12 Length reduction On/Off: Printer Switch 03, Bit 0	

Printer Switches 04 and 05

No	FUNCTION	COMMENTS
0 to 7	Reduction ratios used for different paper sizes (with reduction enabled in switch 03-0 above) If reduction is enabled, the data will be reduced in the length direction before printing. These switches determine the maximum reduction ratio for each paper size. **Cross reference** Page separation and data reduction: section 2.2.12.	

Switch 04/05	US	Europe	Asia
Bit 0	HLT sideways	A5 sideways	A5 sideways
Bit 1	Not used	B5 sideways	B5 sideways
Bit 2	LT lengthwise	B5 lengthwise	B5 lengthwise
Bit 3	Not used	A4 lengthwise	A4 lengthwise
Bit 4	Not used	Not used	F/F4 lengthwise
Bit 5	LG lengthwise	Not used	Not used
Bit 6	Not used	B4 lengthwise	B4 lengthwise
Bit 7	Not used	Not used	Not used

The available paper sizes depends on the machine's country version.

$$\left(\frac{Sw.04}{Sw.05}\right): \left(\frac{0}{0}\right) = 4/3, \left(\frac{1}{0}\right) = 4/3, \left(\frac{0}{1}\right) = 8/7, \left(\frac{1}{1}\right) = 12/11$$

Printer Switch 06 - Not used (do not change the factory settings).
Printer Switch 07 - Not used (do not change the factory settings).
Printer Switch 08 - Not used (do not change the factory settings).
Printer Switch 09 - Not used (do not change the factory settings).
Printer Switch 0A - Not used (do not change the factory settings).
Printer Switch 0B - Not used (do not change the factory settings).
Printer Switch 0C - Not used (do not change the factory settings).
Printer Switch 0D - Not used (do not change the factory settings).
Printer Switch 0E - Not used (do not change the factory settings).
Printer Switch 0F - Not used (do not change the factory settings).

4.2.4. Communication Switches

Communication Switch 00		
No	**FUNCTION**	**COMMENTS**
0 **1**	Compression modes available in receive mode **Bit 1 0 Modes** 0 0 MH only 0 1 MH/MR 1 0 MH/MR/MMR 1 1 Not used	These bits determine the compression capabilities to be declared in phase B (handshaking) of the T.30 protocol.
2 **3**	Compression modes available in transmit mode **Bit 3 2 Modes** 0 0 MH only 0 1 MH/MR 1 0 MH/MR/MMR 1 1 Not used	These bits determine the compression capabilities to be used in transmission and to be declared in phase B (handshaking) of the T.30 protocol. **Cross reference** EFC compression in transmission: Communication Switch 01, bit 1.
4 **5** **6** **7**	Not used	Do not change the settings.

Communication Switch 01		
No	**FUNCTION**	**COMMENTS**
0	ECM **0:** Off **1:** On	If this bit is 0, ECM is switched off for all communications.
1	EFC during transmission **0:** Off **1:** On	If this bit is 0, EFC is switched off during transmission.
2 **3**	Wrong connection prevention method **Bit 3 Bit 2 Setting** 0 0 None 0 1 8 digit CSI 1 0 4 digit CSI 1 1 CSI/RTI	**(0,1) -** The machine will not transmit if the last 8 digits of the received CSI do not match the last 8 digits of the dialed telephone number. This does not work for manual dialing. **(1,0) -** The same as above, except that only the last 4 digits are compared. **(1,1) -** The machine will not transmit if the other end does not identify itself with an RTI or CSI. **(0,0) -** Nothing is checked; transmission will always go ahead.
4	Operator call if no response is received in reply to NSF/DIS **0:** Disabled **1:** Enabled	Set this bit to 1 if the user expects to receive phone calls at the same number which the machine is connected to.
5	Not used	Do not change the setting.
6 **7**	Maximum printable page length available **Bit 7 Bit 6 Setting** 0 0 No limit 0 1 B4 and A4 1 0 A4 1 1 Not used	The setting determined by these bits is informed to the transmitting terminal in the pre-message protocol exchange (in the DIS/NSF frames).

Communication Switch 02		
No	**FUNCTION**	**COMMENTS**
0	Burst error threshold **0:** Low **1:** High	If there are more consecutive error lines in the received page than the threshold, the machine will send a negative response. The Low and High threshold values depend on the sub-scan resolution, and are as follows. **Resolution** **Standard** **Detail** Low settings 3 6 High settings 6 12
1	Acceptable total error line ratio **0:** 5% **1:** 10%	If the error line ratio of a page exceeds the acceptable ratio, RTN will be sent to the other end.
2	Treatment of pages received with errors during G3 reception **0:** Deleted from memory without printing **1:** Printed	**0:** Pages received with errors are not printed.
3	Hang-up decision when a negative code (RTN or PIN) is received during G3 immediate transmission **0:** No hang-up, **1:** Hang-up	**0:** The next page will be sent even if RTN or PIN is received. **1:** The machine will send DCN and hang up if it receives RTN or PIN. This bit is ignored for memory transmissions or if ECM is being used.
4 to 7	Not used	Do not change the settings.

Communication Switch 03		
No	**FUNCTION**	**COMMENTS**
0 to 7	Maximum number of page retransmissions in a G3 memory transmission	00 - FF (Hex) times. This setting is not used if ECM is switched on.

Communication Switch 04 - Not used (do not change the factory settings).
Communication Switch 05 - Not used (do not change the factory settings).

Communication Switch 06		
No	**FUNCTION**	**COMMENTS**
0	Dialing requirements: Germany **0:** Disabled **1:** Enabled	These switches are automatically set to the settings required by each country after a country code (System Switch 0F) is programmed.
1	Dialing requirements: Austria **0:** Disabled **1:** Enabled	
2	Dialing requirements: Norway **0:** Disabled **1:** Enabled	
3	Dialing requirements: Denmark **0:** Disabled **1:** Enabled	
4	Dialing requirements: France **0:** Disabled **1:** Enabled	
5	Dialing requirements: Switzerland **0:** Disabled **1:** Enabled	
6	Not used	Do not change the settings.
7		

Communication Switch 07 - Not used (do not change the factory settings).
Communication Switch 08 - Not used (do not change the factory settings).
Communication Switch 09 - Not used (do not change the factory settings).

Communication Switch 0A		
No	**FUNCTION**	**COMMENTS**
0	Point of resumption of memory transmission upon redialing **0:** From the error page **1:** From page 1	**0:** The transmission begins from the page where transmission failed the previous time. **1:** Transmission begins from the first page.
1 to 6	Not used	Do not change the settings.
7	Emergency calls using 999 **0:** Enabled **1:** Disabled	If this bit is at 1, the machine will not allow you to dial 999 at the auto-dialer. This is a PTT requirement in the UK and some other countries.

Communication Switch 0B - Not used (do not change the factory settings).
Communication Switch 0C - Not used (do not change the factory settings).

Communication Switch 0D		
No	**FUNCTION**	**COMMENTS**
0 to 7	The amount of remaining memory below which ringing detection (and therefore reception into memory) is disabled	00 to FF (Hex), unit = 2 kbytes (e.g., 40(H) = 128 kbytes) One page is about 24 kbytes. If this setting is kept at 0, the machine will detect ringing signals and go into receive mode even if there is no memory space left. This will result in communication failure.

Communication Switch 0E		
No	**FUNCTION**	**COMMENTS**
0 to 7	Minumum interval between automatic dialing attempts	06 to FF (Hex), unit = 2 s (e.g., 06(H) = 12 s) This value is the minimum time that the machine waits before it dials the next destination.

Communication Switch 0F - Not used (do not change the factory settings).

Communication Switch 10		
No	**FUNCTION**	**COMMENTS**
0 to 7	Memory transmission: Maximum number of dialing attempts to the same destination	01 - FF (Hex) times

Communication Switch 11		
No	**FUNCTION**	**COMMENTS**
0 to 7	Immediate transmission: Maximum number of dialing attempts to the same destination	01 - FF (Hex) times

Communication Switch 12		
No	**FUNCTION**	**COMMENTS**
0 to 7	Memory transmission: Interval between dialing attempts to the same destination	00 - FF (Hex) minutes

Communication Switch 13		
No	**FUNCTION**	**COMMENTS**
0 to 7	Immediate transmission: Interval between dialing attempts to the same destination	00 - FF (Hex) minutes

Communication Switch 14 - Not used (do not change the factory settings).
Communication Switch 15 - Not used (do not change the factory settings).
Communication Switch 16 - Not used (do not change the factory settings).
Communication Switch 17 - Not used (do not change the factory settings).
Communication Switch 18 - Not used (do not change the factory settings).
Communication Switch 19 - Not used (do not change the factory settings).
Communication Switch 1A - Not used (do not change the factory settings).
Communication Switch 1B - Not used (do not change the factory settings).
Communication Switch 1C - Not used (do not change the factory settings).
Communication Switch 1D - Not used (do not change the factory settings).
Communication Switch 1E - Not used (do not change the factory settings).
Communication Switch 1F - Not used (do not change the factory settings).

4.2.5. G3 Switches

G3 Switch 00		
No	**FUNCTION**	**COMMENTS**
0 **1**	Monitor speaker during communication (tx and rx) **Bit 1 Bit 0 Setting** 0 0 Disabled 0 1 Up to Phase B 1 0 All the time 1 1 Not used	(0, 0): The monitor speaker is disabled all through the communication. **(0, 1):** The monitor speaker is on up to phase B in the T.30 protocol. **(1, 0):** Used for testing. The monitor speaker is on all through the communication. Make sure that you reset these bits after testing.
2	Monitor speaker during memory transmission **0:** Disabled **1:**Enabled	**1:** The monitor speaker is enabled during memory transmission.
3 to 6	Not used	Do not change the settings.
7	Back to back test **0:** Disabled **1:** Enabled	Set this bit to 1 when you wish to do a back to back test. **115 V model:** Be sure to connect jumpers JP5 and JP6 on the NCU before doing the test. **220 V model:** Be sure to apply dc voltage between wires L1 and L2 on the NCU.

G3 Switch 01		
No	**FUNCTION**	**COMMENTS**
0 to 3	Not used	Do not change the settings.
4	DIS frame length **0:** 6 bytes **1:** 4 bytes	**1:** The 5th and 6th bytes in the DIS frame will not be transmitted (set this bit to 1 when there are communication problems with PC-based faxes).
5	Not used	Do not change the settings.
6		
7		

G3 Switch 02		
No	**FUNCTION**	**COMMENTS**
0	G3 protocol mode used **0:** Standard and non-standard **1:** Standard only	**1:** Disables NSF/NSS signals (these are used in non-standard mode communication)
1 to 4	Not used	Do not change the settings.
5	Use of modem rate history during AI short protocol **0:** Disabled **1:** Enabled	**0:** Communications using AI short protocol always start with the highest modem rate. **1:** The machine uses the modem rate history for communications with the same machine when determining the most suitable rate for the current communication.
6	AI short protocol (transmission and reception) **0:** Disabled **1:** Enabled	Refer to Appendix B in the Group 3 Facsimile Manual for details on AI short protocol.
7	Not used	Do not change the setting.

G3 Switch 03		
No	**FUNCTION**	**COMMENTS**
0	DIS detection number (Echo countermeasure) **0:** 1 **1:** 2	**0:** The machine will hang up if it receives the same DIS frame twice. **1:** Before sending DCS, the machine will wait for the second DIS which is caused by echo on the line.
1	Not used	Do not change the setting.
2		
3	ECM frame size in tx (bytes) **0:** 256 **1:** 64	1: The machine transmits with a frame size of 64 bytes in ECM. Set this bit to 1 when the other terminal has only a 64 byte ECM frame size.
4	CTC transmission conditions **0:** Ricoh mode (PPR x 1) **1:** ITU-T mode (PPR x 4)	When using ECM, the machine will choose a slower modem rate after receiving PPR once (Ricoh mode) or four times (ITU-T mode). ITU-T: New acronym for the CCITT.
5	Modem rate used for the next page after receiving a negative code (RTN or PIN) **0:** No change **1:** Fallback	**1:** The machine's tx modem rate will fall back before sending the next page if a negative code is received. This bit is ignored if ECM is being used.
6	Not used	Do not change the setting.
7		

G3 Switch 04		
	FUNCTION	**COMMENTS**
0 to 3	Training error detection threshold	00 - 0F (Hex); 0 - 15 bits If the number of error bits in the received TCF is below this threshold, the machine informs the sender that the training has succeeded.
4 to 7	Not used	Do not change the settings.

G3 Switch 05		
No	**FUNCTION**	**COMMENTS**
0 to 3	Initial Tx modem rate **Bit 3 2 1 0 Setting (bps)** 0 0 0 1 2.4k 0 0 1 0 4.8k 0 0 1 1 7.2k 0 1 0 0 9.6k Other settings - Not used	These bits set the initial starting modem rate for transmission.
4 to 7	Not used	Do not change the settings.

G3 Switch 06		
	FUNCTION	**COMMENTS**
0 to 3	Initial Rx modem rate **Bit 3 2 1 0 Setting (bps)** 0 0 0 1 2.4 k 0 0 1 0 4.8 k 0 0 1 1 7.2 k 0 1 0 0 9.6 k Other settings - Not used	The setting of these bits is used to inform the transmitting terminal of the available modem rate for the machine in receive mode.
4 to 7	Modem types available for reception **Bit 7 6 5 4 Setting** 0 0 0 1 V27ter 0 0 1 0 V27ter, V29 Other settings - Not used	The setting of these bits is used to inform the transmitting terminal of the available modem type for the machine in receive mode.

G3 Switch 07		
	FUNCTION	**COMMENTS**
0 **1**	PSTN cable equalizer (tx mode) **Bit 1 Bit 0 Setting** 0 0 None 0 1 Low 1 0 Medium 1 1 High	Use a higher setting if there is signal loss at higher frequencies because of the length of wire between the modem and the telephone exchange. Also, try using the cable equalizer if one or more of the following symptoms occurs. • Communication error • Modem rate fallback occurs frequently.
2 **3**	PSTN cable equalizer (rx mode) **Bit 3 Bit 2 Setting** 0 0 None 0 1 Low 1 0 Medium 1 1 High	Use a higher setting if there is signal loss at higher frequencies because of the length of wire between the modem and the telephone exchange. Also, try using the cable equalizer if one or more of the following symptoms occurs. • Communication error with error codes such as 0-20, 0-23, etc. • Modem rate fallback occurs frequently.
4-7	Not used	Do not change the settings.

G3 Switch 08		
	FUNCTION	**COMMENTS**
0 **1**	PABX cable equalizer (tx mode) **Bit 1 Bit 0 Setting** 0 0 None 0 1 Low 1 0 Medium 1 1 High	Use a higher setting if there is signal loss at higher frequencies because of the length of wire between the modem and the telephone exchange. Also, try using the cable equalizer if one or more of the following symptoms occurs. • Communication error • Modem rate fallback occurs frequently.
2 **3**	PABX cable equalizer (rx mode) **Bit 3 Bit 2 Setting** 0 0 None 0 1 Low 1 0 Medium 1 1 High	Use a higher setting if there is signal loss at higher frequencies because of the length of wire between the modem and the telephone exchange. Also, try using the cable equalizer if one or more of the following symptoms occurs. • Communication error with error codes such as 0-20, 0-23, etc. • Modem rate fallback occurs frequently.
4-7	Not used	Do not change the settings.

G3 Switch 09 - Not used (do not change the factory settings).

G3 Switch 0A

	FUNCTION	COMMENTS
0 **1**	Maximum allowable carrier drop during image data reception **Bit 1** **Bit 0** **Value (ms)** 0 0 200 0 1 400 1 0 800 1 1 Not used	These bits set the acceptable modem carrier drop time. Try using a longer setting if error code 0-22 is frequent.
2	Not used	Do not change the settings.
3		
4	Maximum allowable frame interval during image data reception. **0:** 5 s **1:** 13 s	This bit set the maximum intervals between each EOL signal (end-of-line) or intervals between each ECM frame from the other end. Try using a longer setting if error code 0-21 is frequent.
5	Not used	Do not change the settings.
6	Reconstruction time for the first line in receive mode **0:** 6 s **1:** 12 s	When the sending terminal is controlled by a computer, there may be a delay in receiving page data after the local machine accepts set-up data and sends CFR. If this occurs, set this bit to 1 to give the sending machine more time to send data. Refer to error code 0-20.
7	Not used	Do not change the settings.

G3 Switch 0B

	FUNCTION	COMMENTS
0	Protocol requirements: Europe **0:** Disabled **1:** Enabled	Manually set these bit switches to the appropriate settings after a country code (System Switch 0F) is programmed.
1	Protocol requirements: Norway **0:** Disabled **1:** Enabled	
2	Protocol requirements: Germany **0:** Disabled **1:** Enabled	
3	Protocol requirements: France **0:** Disabled **1:** Enabled	
4	PTT requirements: Germany **0:** Disabled **1:** Enabled	
5	PTT requirements: France **0:** Disabled **1:** Enabled	

G3 Switch 0B		
	FUNCTION	**COMMENTS**
6	Not used	Do not change the settings.
7		

G3 Switch 0C		
	FUNCTION	**COMMENTS**
0 **1**	Pulse dialing method **Bit 1 Bit 0 Setting** 0 0 Normal (P=N) 0 1 Oslo (P=10 - N) 1 0 Sweden (N+1) 1 1 Not used	P=Number of pulses sent out, N=Number dialed.
2 to 7	Not used	Do not change the settings.

G3 Switch 0D - Not used (do not change the factory settings).
G3 Switch 0E - Not used (do not change the factory settings).
G3 Switch 0F - Not used (do not change the factory settings).

4.3. NCU PARAMETERS

The following tables give the RAM addresses and units of calculation of the parameters that the machine uses for ringing signal detection and automatic dialing. The factory settings for each country are also given. Most of these must be changed by RAM read/write (Function 06), but some can be changed using NCU Parameter programming (Function 08); if Function 08 can be used, this will be indicated in the Remarks column. The RAM is programmed in hex code unless (BCD) is included in the Unit column.

<table>
<tr><th>Address</th><th>Function</th><th>Unit</th><th>Remarks</th></tr>
<tr><td>807F00</td><td>Country code for NCU parameters</td><td colspan="2">Use the Hex value to program the country code directly into this address, or use the decimal value to program it using Function 08 (parameter C.C.).

<table>
<tr><th>Country</th><th>Decimal</th><th>Hex</th></tr>
<tr><td>France</td><td>00</td><td>00</td></tr>
<tr><td>Germany</td><td>01</td><td>01</td></tr>
<tr><td>UK</td><td>02</td><td>02</td></tr>
<tr><td>Italy</td><td>03</td><td>03</td></tr>
<tr><td>Austria</td><td>04</td><td>04</td></tr>
<tr><td>Belgium</td><td>05</td><td>05</td></tr>
<tr><td>Denmark</td><td>06</td><td>06</td></tr>
<tr><td>Finland</td><td>07</td><td>07</td></tr>
<tr><td>Ireland</td><td>08</td><td>08</td></tr>
<tr><td>Norway</td><td>09</td><td>09</td></tr>
<tr><td>Sweden</td><td>10</td><td>0A</td></tr>
<tr><td>Switzerland</td><td>11</td><td>0B</td></tr>
<tr><td>Portugal</td><td>12</td><td>0C</td></tr>
<tr><td>Holland</td><td>13</td><td>0D</td></tr>
<tr><td>Spain</td><td>14</td><td>0E</td></tr>
<tr><td>Israel</td><td>15</td><td>0F</td></tr>
<tr><td>USA</td><td>17</td><td>11</td></tr>
<tr><td>Asia</td><td>18</td><td>12</td></tr>
<tr><td>Hong Kong</td><td>20</td><td>14</td></tr>
<tr><td>South Africa</td><td>21</td><td>15</td></tr>
<tr><td>Australia</td><td>22</td><td>16</td></tr>
<tr><td>New Zealand</td><td>23</td><td>17</td></tr>
<tr><td>Singapore</td><td>24</td><td>18</td></tr>
<tr><td>Malaysia</td><td>25</td><td>19</td></tr>
</table></td></tr>
<tr><td>807F01</td><td>Line current detection time</td><td rowspan="3">20 ms</td><td rowspan="3">Line current is not detected if 807F01 contains FF.</td></tr>
<tr><td>807F02</td><td>Line current wait time</td></tr>
<tr><td>807F03</td><td>Line current drop detect time</td></tr>
<tr><td>807F04</td><td>PSTN dial tone frequency range (high byte)</td><td rowspan="2">Hz (BCD)</td><td rowspan="2">See Note 2.</td></tr>
<tr><td>807F05</td><td>PSTN dial tone frequency range (low byte)</td></tr>
</table>

Address	Function	Unit	Remarks
807F06	Not used		Do not change the factory setting.
807F07			
807F08	PSTN dial tone detection time	20 ms	If 807F08 contains FF, the machine pauses for the pause time (address 807F0D / 807F0E). See Note 3 (Italy).
807F09	PSTN dial tone reset time (LOW)		
807F0A	PSTN dial tone reset time (HIGH)		
807F0B	PSTN dial tone continuous tone time		
807F0C	PSTN dial tone permissible drop time		
807F0D	PSTN wait interval (LOW)		
807F0E	PSTN wait interval (HIGH)		
807F0F	PSTN ringback tone detection time	20 ms	Detection is disabled if this contains FF.
807F10	PSTN ringback tone off detection time	20 ms	
807F11	PSTN detection time for silent period after ringback tone detected (LOW)	20 ms	
807F12	PSTN detection time for silent period after ringback tone detected (HIGH)	20 ms	
807F13	PSTN busy tone frequency range (high byte)	Hz (BCD)	If 807F13 is FF, detection is disabled. See Note 2.
807F14	PSTN busy tone frequency range (low byte)		
807F15	Not used		Do not change the factory settings.
807F16			
807F17	PABX dial tone frequency range (high byte)	Hz (BCD)	See Note 2.
807F18	PABX dial tone frequency range (low byte)		
807F19	Not used		Do not change the factory settings.
807F1A			
807F1B	PABX dial tone detection time	20 ms	If 807F1B contains FF, the machine pauses for the pause time (807F20 / 807F21).
807F1C	PABX dial tone reset time (LOW)		
807F1D	PABX dial tone reset time (HIGH)		
807F1E	PABX dial tone continuous tone time		
807F1F	PABX dial tone permissible drop time		
807F20	PABX wait interval (HIGH)		
807F21	PABX wait interval (LOW)		
807F22	PABX ringback tone detection time	20 ms	Detection is disabled if this contains FF.
807F23	PABX ringback tone off detection time	20 ms	

Address	Function	Unit	Remarks
807F24	PABX detection time for silent period after ringback tone detected (LOW)	20 ms	
807F25	PABX detection time for silent period after ringback tone detected (HIGH)	20 ms	
807F26	PABX busy tone frequency range (high byte)	Hz (BCD)	If this is FF, detection is disabled. See Note 2.
807F27	PABX busy tone frequency range (low byte)		See Note 2.
807F28	Not used		Do not change the factory settings.
807F29			
807F2A	Busy tone ON time: range 1	20 ms	
807F2B	Busy tone OFF time: range 1		
807F2C	Busy tone ON time: range 2		
807F2D	Busy tone OFF time: range 2		
807F2E	Busy tone ON time: range 3		
807F2F	Busy tone OFF time: range 3		
807F30	Busy tone ON time: range 4		
807F31	Busy tone OFF time: range 4		
807F32	Busy tone continuous tone detection time		
807F33	Busy tone signal state time tolerance for all ranges, and number of cycles required for detection (a setting of 4 cycles means that ON-OFF-ON or OFF-ON-OFF must be detected twice). Tolerance (±) Bit 1 0 0 0 75% Bits 2 and 3 must always 0 1 50% be kept at 0. 1 0 25% 1 1 12.5% Bits 7, 6, 5, 4 - number of cycles required for cadence detection		
807F34	International dial tone frequency range (high byte)	Hz (BCD)	See Note 2.
807F35	International dial tone frequency range (low byte)		
807F36	Not used		Do not change the factory settings
807F37			

Address	Function	Unit	Remarks
807F38	International dial tone detection time	20 ms	If 807F38 contains FF, the machine pauses for the pause time (807F3D / 807F3E). See Note 3 (Belgium).
807F39	International dial tone reset time (LOW)		
807F3A	International dial tone reset time (HIGH)		
807F3B	International dial tone continuous tone time		
807F3C	International dial tone permissible drop time		
807F3D	International dial wait interval (HIGH)		
807F3E	International dial wait interval (LOW)		
807F3F	Country dial tone upper frequency limit (HIGH)	Hz (BCD)	See Note 2.
807F40	Country dial tone upper frequency limit (LOW)		
807F41	Country dial tone lower frequency limit (HIGH)		
807F42	Country dial tone lower frequency limit (LOW)		
807F43	Country dial tone detection time	20 ms	If 807F43 contains FF, the machine pauses for the pause time (807F48 / 807F49).
807F44	Country dial tone reset time (LOW)		
807F45	Country dial tone reset time (HIGH)		
807F46	Country dial tone continuous tone time		
807F47	Country dial tone permissible drop time		
807F48	Country dial wait interval (LOW)		
807F49	Country dial wait interval (HIGH)		
807F4A	Time between opening or closing the Ds relay and opening the Di relay	1 ms	See Notes 4 and 7. Function 08 (parameter 11).
807F4B	Break time for pulse dialling	1 ms	See Note 4. Function 08 (parameter 12).
807F4C	Make time for pulse dialling	1 ms	See Note 4. Function 08 (parameter 13).
807F4D	Time between final Di relay closure and Ds relay opening or closing	1 ms	See Notes 4 and 7. Function 08 (parameter 14).
807F4E	Minimum pause between dialled digits (pulse dial mode)	20 ms	See Note 4. Function 08 (parameter 15).
807F4F	Time waited when a pause is entered at the operation panel		Function 08 (parameter 16). See Note 4.
807F50	DTMF tone on time	1 ms	Function 08 (parameter 17).
807F51	DTMF tone off time		Function 08 (parameter 18).

Address	Function	Unit	Remarks
807F52	Tone attenuation value in DTMF signals	-dBm x 0.5	Function 08 (parameter 19). See Note 6.
807F53	Tone attenuation value difference between high frequency tone and low frequency tone in DTMF signals	-Nx0.5 (dB)	Function 08 (parameter 20). See Note 6.
807F54	PSTN: DTMF tone attenuation level after dialling	-dBm x 0.5	Function 08 (parameter 21). See Note 6.
807F55 to 807F58	Not used		Do not change the settings.
807F59	Grounding time (ground start mode)	20 ms	The Gs relay is closed for this interval.
807F5A	Break time (flash start mode)	1 ms	The OHDI relay is open for this interval.
807F5B 807F5C	International dial access code	BCD	For a code of 100: 807F5B - F1 807F5C - 00
807F5D	PSTN access pause time	20 ms	This time is waited for each pause input after the PSTN access code. Up to 7 of these can be input. If this address contains FF[H], the pause time stored in address 807F4F is used.
807F5E	Progress tone detection level, and cadence detection enable flags	Bit 7 Bit 6 Bit 5 dBm 0 0 0 -25.0 0 0 1 -35.0 0 1 0 -30.0 1 0 0 -40.0 1 1 0 -49.0 Bits 2, 0 - See Note 3.	
807F5F	Polarity detection	Bit 4 1: Enable: Tx Polarity detection Bit 5 1: Enable: Rx Polarity detection	
807F60 to 807F64	Not used		Do not change the settings.
807F65	Intercity dial prefix (HIGH)	BCD	For a code of 0: 807F65 - FF 807F66 - F0
807F66	Intercity dial prefix (LOW)	BCD	
807F67 to 807F71	Not used		Do not change the settings.

Address	Function	Unit	Remarks
807F72	Acceptable ringing signal frequency: range 1, upper limit	1000/ N (Hz).	Function 08 (parameter 02).
807F73	Acceptable ringing signal frequency: range 1, lower limit		Function 08 (parameter 03).
807F74	Acceptable ringing signal frequency: range 2, upper limit		Function 08 (parameter 04).
807F75	Acceptable ringing signal frequency: range 2, lower limit		Function 08 (parameter 05).
807F76	Number or rings until a call is detected	1	Function 08 (parameter 06).
807F77	Minimum required length of the first ring	20 ms	See Note 5. Function 09 (parameter 07).
807F78	Minimum required length of the second and subsequent rings	20 ms	Function 08 (parameter 08).
807F79	Ringing signal detection reset time (LOW)	20 ms	Function 08 (parameter 09).
807F7A	Ringing signal detection reset time (HIGH)		Function 08 (parameter 10).
807F7B to 807F80	Not used		Do not change the settings.
807F81	Interval between dialing the last digit and switching the Oh relay over to the external telephone when dialing from the operation panel in handset mode.	20 ms	Factory setting: 500 ms
807F82	Bits 0 and 1 - Handset off-hook detection time **Bit 1 0 Setting** 0 0 200 ms 0 1 800 ms Other Not used Bits 2 and 3 - Handset on-hook detection time **Bit 3 2 Setting** 0 0 200 ms 0 1 800 ms Other Not used Bits 4 to 7 - Not used		
807FA1	Acceptable CED detection range (high byte)	BCD (Hz)	See Note 2.
807FA2	Acceptable CED detection range (low byte)		
807FA3	Not used		Do not change the factory setting.
807FA4			
807FA5	CED detection time	20 ms ± 20 ms	Factory setting: 200 ms

Address	Function	Unit	Remarks
807FA6	Not used		Do not change the factory setting.
807FA7			
807FA8			
807FA9			
807FAA	CNG detection time	20 ms ± 20 ms	Factory setting: 200 ms
807FAB	CNG on time	20 ms	Factory setting: 500 ms
807FAC	CNG off time	20 ms	Factory setting: 200 ms
807FAD	Number of CNG cycles required for detection		The data is coded in the same way as address 807F33. Factory setting: 23(H)
807FAE	Not used		Do not change the settings.
807FAF			
807FB0			
807FB1			
807FB2			
807FB3	Detection time for 800 Hz AI short protocol tone	20 ms	Factory setting: 360 ms
807FB4	PSTN: Tx level from the modem	- dBm	Function 08 (parameter 01).
807FB5	PSTN: 1100 Hz tone transmission level	- N $_{807FB4}$ - 0.5N $_{807FB5}$ (dB)	
807FB6	PSTN: 2100 Hz tone transmission level	- N $_{807FB4}$ - 0.5N $_{807FB6}$ (dB)	
807FB7	PABX: Tx level from the modem	- dBm	
807FB8	PABX: 1100 Hz tone transmission level	- N $_{807FB7}$ - 0.5N $_{807FB8}$ (dB)	
807FB9	PABX: 2100 Hz tone transmission level	- N $_{807FB7}$ - 0.5N $_{807FB9}$ (dB)	
807FBA to 807FBC	Not used		Do not change the settings.
807FBD	Modem turn-on level (incoming signal detection level)	-37-0.5N (dBm)	
807FDA	T.30 T1 timer	1 s	

Notes

1. If a setting is not required, store FF in the address.
2. Tone frequencies are stored as look-up tables in hex code. For each parameter, there is a look-up table for each country that uses it. The tables are given following this page. For each parameter, do not input a RAM value that is not included in the table.
3. Italy and Belgium only

   RAM address 807F5E: the lower four bits have the following meaning.
   Bit 2 1: International dial tone cadence detection enabled (Belgium)
   Bit 1 Not used
   Bit 0 1: PSTN dial tone cadence detection enabled (Italy)

   If bit 0 or bit 2 is set to 1, the functions of the following RAM addresses are changed.
   807F08 (if bit 0 = 1) or 807F38 (if bit 2 = 1): tolerance for on or off state duration (%), and number of cycles required for detection, coded as in address 807F33.
   807F0B (if bit 0 = 1) or 807F3B (if bit 2 = 1): on time, hex code (unit = 20 ms)
   807F0C (if bit 0 = 1) or 807F3C(if bit 2 = 1): off time, hex code (unit = 20 ms)
4. Pulse dial parameters (addresses 807F4A to 807F4F) are the values for 10 pps. If 20 pps is used, the machine automatically compensates.
5. The first ring may not be detected until 1 to 2.5 wavelengths after the time specified by this parameter.
6. The calculated level must be between 0 and 10.
   The attenuation levels calculated from RAM data are:
   High frequency tone: - 0.5 x $N_{807F52/807F54}$ dBm
   Low frequency tone: - 0.5 x ($N_{807F52/807F54}$ + N_{807F53}) dBm
   Note: N_{807F52}, for example, means the value stored in address 807F52(H)
7. 807F4A: Europe - Between Ds opening and Di opening, France - Between Ds closing and Di opening
   807F4D: Europe - Between Ds closing and Di closing, France - Between Ds opening and Di closing

Tone Detection Frequency Ranges

- PSTN Dial Tone (807F04 - 807F05) -

France		Germany		Italy	
RAM Value [H]	Range (Hz)	RAM Value [H]	Range (Hz)	RAM Value [H]	Range (Hz)
040	415 - 465	060	400 - 480	030 (Default)	410 - 440
050	410 - 470	070	390 - 485	040	400 - 450
060 (Default)	400 - 475	080	385 - 490	050	395 - 455
070	395 - 480	090 (Default)	380 - 495	060	385 - 460
080	390 - 485	0A0	370 - 500	070	380 - 465
090	380 - 490	0B0	365 - 505	080	375 - 470
0A0	375 - 495	0C0	360 - 510	090	365 - 475
0B0	465 - 500	0D0	350 - 515		
		0E0	345 - 520		

Austria, Belgium		Denmark		Finland	
RAM Value [H]	Range (Hz)	RAM Value [H]	Range (Hz)	RAM Value [H]	Range (Hz)
0A8	380 - 505	0B0	360 - 505	0C8	340 - 520
0B8	370 - 515	0C0	350 - 515	0D8	330 - 525
0C8 (Default)	365 - 520	0D0 (Default)	340 - 520	0E8	325 - 535
0D8	355 - 530	0E0	335 - 525	0F8 (Default)	315 - 540
0E8	345 - 535	0F0	325 - 530	108	310 - 545
0F8	340 - 540	100	320 - 540	118	300 - 550
108	335 - 545	110	310 - 545	128	295 - 555
118	320 - 550	120	305 - 550	138	285 - 560
				148	275 - 565

Ireland		Norway		Sweden	
RAM Value [H]	Range (Hz)	RAM Value [H]	Range (Hz)	RAM Value [H]	Range (Hz)
098	255 - 425	0A0	355 - 475	070	380 - 465
0A8	245 - 430	0B0	345 - 490	080	375 - 470
0B8	235 - 440	0C0	335 - 500	090	365 - 475
0C8	225 - 445	0D0	325 - 505	0A0 (Default)	360 - 480
0D8	210 - 450	0E0 (Default)	320 - 510	0B0	355 - 485
0E8 (Default)	200 - 455	0F0	310 - 515	0C0	345 - 490
		100	305 - 520	0D0	335 - 500
		110	290 - 525	0E0	330 - 505
				0F0	320 - 510

Switzerland		Portugal		Holland	
RAM Value [H]	**Range (Hz)**	**RAM Value [H]**	**Range (Hz)**	**RAM Value [H]**	**Range (Hz)**
0F0	385 - 560	090	315 - 440	120	290 - 580
100	380 - 565	0A0	305 - 450	130	280 - 585
110	370 - 570	0B0 (Default)	295 - 455	140 (Default)	270 - 590
120 (Default)	365 - 575	0C0	285 - 465	150	265 - 595
130	355 - 580	0D0	275 - 470	160	255 - 600
140	350 - 585	0E0	270 - 475		
150	340 - 590	0F0	260 - 480		
160	330 - 595	100	250 - 490		
170	325 - 600				

Spain		Israel		Australia	
RAM Value [H]	**Range (Hz)**	**RAM Value [H]**	**Range (Hz)**	**RAM Value [H]**	**Range (Hz)**
0B0	320 - 480	0AA	350 - 490	FFFF (Default)	Tone not detected
0C0	310 - 490	0BA (Default)	340 - 500	0C0	190 - 425
0D0	305 - 495	0CA	335 - 510	0D0	170 - 435
0E0 (Default)	295 - 500	0DA	325 - 515	0E0	160 - 440
0F0	285 - 510	0EA	320 - 520	0F0	135 - 435
100	275 - 515	0FA	310 - 525	100	130 - 430
110	265 - 520	10A	300 - 530		
120	255 - 525				
130	245 - 530				

- PABX Dial Tone (807F17 - 807F18) -

Italy		Belgium		Denmark	
RAM Value [H]	**Range (Hz)**	**RAM Value [H]**	**Range (Hz)**	**RAM Value [H]**	**Range (Hz)**
098	405 - 495	0A8	370 - 505	0B0	360 - 505
0A8	395 - 505	0B8	380 - 515	0C0	350 - 515
0B8 (Default)	375 - 515	0C8 (Default)	365 - 520	0D0 (Default)	340 - 520
0C8	370 - 520	0D8	355 - 530	0E0	335 - 525
0D8	360 - 525	0E8	345 - 535	0F0	325 - 530
0E8	355 - 530	0F8	340 - 540	100	320 - 540
0F8	345 - 540	108	335 - 545	110	310 - 545
108	340 - 545	118	320 - 550	120	305 - 550

Sweden		Switzerland		Australia	
RAM Value [H]	Range (Hz)	RAM Value [H]	Range (Hz)	RAM Value [H]	Range (Hz)
070	380 - 465	0F0	385 - 560	FFFF (Default)	Tone not detected
080	375 - 470	100	380 - 565	030	405 - 445
090	365 - 475	110	370 - 570	040	415 - 455
0A0 (Default)	360 - 480	120 (Default)	365 - 575	050	400 - 460
0B0	355 - 485	130	355 - 580	060	390 - 465
0C0	345 - 490	140	350 - 585	070	385 - 470
0D0	335 - 500	150	340 - 590	080	380 - 475
0E0	330 - 505	160	330 - 595	090	370 - 480
0F0	320 - 510	170	325 - 600	0A0	365 - 485

Holland		Israel			
RAM Value [H]	Range (Hz)	RAM Value [H]	Range (Hz)	RAM Value [H]	Range (Hz)
120	290 - 580	040	380 - 430		
130	280 - 585	050 (Default)	365 - 435		
140 (Default)	270 - 590	060	355 - 440		
150	265 - 595	070	350 - 445		
160	255 - 600	080	340 - 550		
		090	335 - 555		
		0A0	325 - 565		

- International Dial Tone (807F34 - 807F35) -

Belgium		Holland		Spain	
RAM Value [H]	Range (Hz)	RAM Value [H]	Range (Hz)	RAM Value [H]	Range (Hz)
08A	1110 - 1160	FFFF (Default)	Tone not detected	0C0	550 - 645
0AA (Default)	1105 - 1165	112	305 - 590	0D0	545 - 650
0CA	1100 - 1170	122	315 - 595	0E0	540 - 655
0EA	1095 - 1175	132	320 - 600	0F0	535 - 660
10A	1090 - 1180	142	300 - 605	100	525 - 665
12A	1085 - 1185	152	290 - 610	110	520 - 670
14A	1080 - 1190	162	285 - 615	120	515 - 675
		188	270 - 620	130	510 - 680
		198	260 - 625	140	505 - 685
		1A8	250 - 630		

- PSTN Busy Tone (807F13 - 807F14)

France		Germany		U. K.	
RAM Value [H]	Range (Hz)	RAM Value [H]	Range (Hz)	RAM Value [H]	Range (Hz)
042	415 - 465	058	400 - 480	0A0	330 - 470
052	410 - 470	068	390 - 485	0B0	320 - 460
062	400 - 475	078	385 - 490	0C0 (Default)	300 - 480
072 (Default)	395 - 480	088 (Default)	380 - 495	0D0	290 - 485
082	390 - 485	098	370 - 500	0E0	285 - 490
092	380 - 490	0A8	365 - 505	0F0	275 - 495
0A2	375 - 495	0B8	360 - 510	100	265 - 500
0B2	365 - 500	0C8	350 - 515	110	255 - 505
		0D8	345 - 520		

Italy		Austria		Belgium	
RAM Value [H]	Range (Hz)	RAM Value [H]	Range (Hz)	RAM Value [H]	Range (Hz)
030	410 - 440	0E0	370 - 555	042	405 - 460
040 (Default)	400 - 450	0F0	360 - 560	052 (Default)	400 - 465
050	395 - 455	100	355 - 565	062	395 - 475
060	385 - 460	110	345 - 570	072	390 - 480
070	380 - 465	120	340 - 575	082	380 - 485
080	375 - 470	130 (Default)	330 - 580	092	375 - 490
090	365 - 475	140	325 - 585	0A2	365 - 495
		150	315 - 590		
		160	310 - 595		

Denmark		Ireland		Norway	
RAM Value [H]	Range (Hz)	RAM Value [H]	Range (Hz)	RAM Value [H]	Range (Hz)
040	395 - 450	02E	395 - 425	0A4	355 - 475
050	390 - 460	03E (Default)	385 - 435	0B4	345 - 490
060	385 - 465	04E	380 - 440	0C4	335 - 500
070 (Default)	375 - 470	05E	370 - 445	0D4	325 - 505
080	370 - 475	06E	365 - 450	0E4	320 - 510
090	365 - 480	07E	355 - 455	0F4 (Default)	310 - 515
		08E	350 - 465	104	305 - 520
				114	290 - 525

Sweden		Switzerland		Holland	
RAM Value [H]	**Range (Hz)**	**RAM Value [H]**	**Range (Hz)**	**RAM Value [H]**	**Range (Hz)**
030 (Default)	410 - 440	0F0	385 - 560	0F0	335 - 540
040	400 - 450	100	380 - 565	100	325 - 545
050	395 - 455	110	370 - 570	110	320 - 555
060	385 - 460	120 (Default)	365 - 575	120	310 - 560
070	380 - 465	130	355 - 580	130	300 - 565
080	375 - 470	140	350 - 585	140 (Default)	295 - 570
090	365 - 475	150	340 - 590	150	285 - 575
		160	330 - 595		
		170	325 - 600		

Spain		Israel		Australia	
RAM Value [H]	**Range (Hz)**	**RAM Value [H]**	**Range (Hz)**	**RAM Value [H]**	**Range (Hz)**
0A8	330 - 470	040	380 - 430	028	405 - 445
0B8	320 - 460	050 (Default)	365 - 435	038	415 - 455
0C8	300 - 480	060	355 - 440	048 (Default)	400 - 460
0D8 (Default)	290 - 485	070	350 - 445	058	390 - 465
0E8	285 - 490	080	340 - 450	068	385 - 470
0F8	275 - 495	090	335 - 455	078	380 - 475
108	265 - 500	0A0	325 - 465	088	370 - 480
118	255 - 505			098	365 - 485

Portugal					
RAM Value [H]	**Range (Hz)**	**RAM Value [H]**	**Range (Hz)**	**RAM Value [H]**	**Range (Hz)**
FFFF (Default)	Tone not detected				
070	415 - 515				
080	410 - 520				
090	405 - 525				
0A0	395 - 530				
0B0	390 - 535				
0C0	385 - 540				
0D0	380 - 545				

- PABX Busy Tone (807F26 - 807F27)

Italy		Denmark		Switzerland, Israel	
RAM Value [H]	Range (Hz)	RAM Value [H]	Range (Hz)	RAM Value [H]	Range (Hz)
030 (Default)	410 - 440	030	405 - 445	0F0	385 - 560
040	400 - 450	040	415 - 455	100	380 - 565
050	395 - 455	050 (Default)	400 - 460	110	370 - 570
060	385 - 460	060	390 - 465	120 (Default)	365 - 575
070	380 - 465	070	385 - 470	130	355 - 580
080	375 - 470	080	380 - 475	140	350 - 585
090	365 - 475	090	370 - 480	150	340 - 590
		0A0	365 - 485	160	330 - 595

Australia					
RAM Value [H]	Range (Hz)	RAM Value [H]	Range (Hz)	RAM Value [H]	Range (Hz)
038 (Default)	395 - 450				
048	390 - 460				
058	385 - 465				
068	375 - 470				
078	370 - 475				
088	365 - 480				

- CED [2100 Hz] (807FA1 - 807FA2) -

All Areas					
RAM Value [H]	Range (Hz)	RAM Value [H]	Range (Hz)	RAM Value [H]	Range (Hz)
1F0	2100 ± 45				
200 (Default)	2100 ± 50				
230	2100 ± 60				
270	2100 ± 70				
2E0	2100 ± 80				
320	2100 ± 90				
380	2100 ± 100				

Default Settings

The factory settings are quoted either in hexadecimal code (the actual contents of the RAM address) if there is a H after the value in the table, or in decimal (converted from the actual hex contents of the RAM address) if there is no H after the value.

Some RAMs must be stored using BCD; see the NCU Parameter definition table for details.

Country	807F01	807F02	807F03	807F04	807F05
France	FFH	FFH	FFH	0H	60H
Germany	FFH	FFH	FFH	0H	90H
UK	FFH	FFH	FFH	FFH	FFH
Italy	FFH	FFH	FFH	0H	30H
Austria	FFH	FFH	FFH	0H	C8H
Belgium	FFH	FFH	FFH	0H	C8H
Denmark	FFH	FFH	FFH	0H	D0H
Finland	FFH	FFH	FFH	0H	F8H
Ireland	FFH	FFH	FFH	0H	E8H
Norway	FFH	FFH	FFH	0H	C0H
Sweden	FFH	FFH	FFH	0H	A0H
Switzerland	FFH	FFH	FFH	1H	20H
Portugal	FFH	FFH	FFH	0H	B0H
Holland	FFH	FFH	FFH	1H	F0H
Spain	FFH	FFH	FFH	0H	E0H
Israel	FFH	FFH	FFH	0H	BAH
USA	FFH	FFH	FFH	FFH	FFH
Asia	FFH	FFH	FFH	FFH	FFH
Hong Kong	FFH	FFH	FFH	FFH	FFH
South Africa	FFH	FFH	FFH	FFH	FFH
Australia	FFH	FFH	FFH	1H	10H
New Zealand	FFH	FFH	FFH	FFH	FFH
Singapore	FFH	FFH	FFH	FFH	FFH
Malaysia	FFH	FFH	FFH	FFH	FFH

Country	807F06	807F07	807F08	807F09	807F0A
France	4H	00H	75	F4H	1H
Germany	4H	00H	105	CFH	3H
UK	FFH	FFH	FFH	FFH	FFH
Italy	4H	00H	21H	21H	2H
Austria	4H	00H	38	F4H	1H
Belgium	4H	00H	35	20H	03H
Denmark	4H	00H	65	C2H	1H
Finland	4H	00H	125	F4H	1H
Ireland	4H	00H	105	C2H	1H
Norway	4H	00H	55	B6H	3H
Sweden	4H	00H	35	00H	1H
Switzerland	4H	00H	40	21H	2H
Portugal	4H	00H	105	C2H	1H
Holland	04H	00H	75	EEH	2H
Spain	4H	00H	75	3FH	2H
Israel	4H	00H	105	E8H	3H
USA	FFH	FFH	FFH	FFH	FFH
Asia	FFH	FFH	FFH	FFH	FFH
Hong Kong	FFH	FFH	FFH	FFH	FFH
South Africa	FFH	FFH	FFH	FFH	FFH
Australia	4H	00H	150	2CH	1H
New Zealand	FFH	FFH	FFH	FFH	FFH
Singapore	FFH	FFH	FFH	FFH	FFH
Malaysia	FFH	FFH	FFH	FFH	FFH

Country	807F0B	807F0C	807F0D	807F0E	807F0F
France	50	2	0	0	FFH
Germany	105	4	200	0	FFH
UK	FFH	FFH	250	0	FFH
Italy	30	50	200	0	FFH
Austria	40	4	200	0	FFH
Belgium	30	4	200	0	FFH
Denmark	65	4	200	0	FFH
Finland	205	4	200	0	FFH
Ireland	105	4	200	0	FFH
Norway	55	4	200	0	FFH
Sweden	40	3	200	0	FFH
Switzerland	40	2	200	0	5
Portugal	105	4	200	0	FFH
Holland	55	4	200	0	FFH
Spain	50	5	150	0	FFH
Israel	105	4	200	0	FFH
USA	FFH	FFH	100	0	FFH
Asia	FFH	FFH	200	0	FFH
Hong Kong	FFH	FFH	100	0	FFH
South Africa	FFH	FFH	100	0	FFH
Australia	100	8	150	0	FFH
New Zealand	FFH	FFH	200	0	FFH
Singapore	FFH	FFH	100	0	FFH
Malaysia	FFH	FFH	100	0	FFH

Country	807F10	807F11	807F12	807F13	807F14
France	FFH	FFH	FFH	0H	52H
Germany	FFH	FFH	FFH	0H	88H
UK	FFH	FFH	FFH	0H	C0H
Italy	FFH	FFH	FFH	0H	30H
Austria	FFH	FFH	FFH	0H	E8H
Belgium	FFH	FFH	FFH	0H	52H
Denmark	FFH	FFH	FFH	0H	50H
Finland	FFH	FFH	FFH	FFH	FFH
Ireland	FFH	FFH	FFH	0H	3EH
Norway	FFH	FFH	FFH	0H	C0H
Sweden	FFH	FFH	FFH	0H	32H
Switzerland	50	F4H	1H	1H	20H
Portugal	FFH	FFH	FFH	FFH	FFH
Holland	FFH	FFH	FFH	1H	0AH
Spain	FFH	FFH	FFH	0H	D8H
Israel	FFH	FFH	FFH	0H	50H
USA	FFH	FFH	FFH	FFH	FFH
Asia	FFH	FFH	FFH	FFH	FFH
Hong Kong	FFH	FFH	FFH	FFH	FFH
South Africa	FFH	FFH	FFH	FFH	FFH
Australia	FFH	FFH	FFH	0H	38H
New Zealand	FFH	FFH	FFH	FFH	FFH
Singapore	FFH	FFH	FFH	FFH	FFH
Malaysia	FFH	FFH	FFH	FFH	FFH

Country	807F15	807F16	807F17	807F18	807F19
France	4H	00H	2H	F0H	4H
Germany	4H	00H	FFH	FFH	FFH
UK	4H	00H	FFH	FFH	FFH
Italy	4H	00H	0H	B8H	4H
Austria	4H	00H	FFH	FFH	FFH
Belgium	4H	00H	0H	C8H	4H
Denmark	4H	00H	0H	D0H	4H
Finland	FFH	FFH	FFH	FFH	FFH
Ireland	4H	00H	FFH	FFH	FFH
Norway	4H	00H	FFH	FFH	FFH
Sweden	4H	00H	0H	A0H	4H
Switzerland	4H	00H	1H	20H	4H
Portugal	FFH	FFH	FFH	FFH	FFH
Holland	4H	00H	1H	F0H	04H
Spain	4H	00H	FFH	FFH	FFH
Israel	4H	00H	0H	50H	4H
USA	FFH	FFH	FFH	FFH	FFH
Asia	FFH	FFH	FFH	FFH	FFH
Hong Kong	FFH	FFH	FFH	FFH	FFH
South Africa	FFH	FFH	FFH	FFH	FFH
Australia	4H	00H	0H	50H	4H
New Zealand	FFH	FFH	FFH	FFH	FFH
Singapore	FFH	FFH	FFH	FFH	FFH
Malaysia	FFH	FFH	FFH	FFH	FFH

Country	807F1B	807F1C	807F1D	807F1E	807F1F
France	100	58H	2H	50	2H
Germany	FFH	FFH	FFH	FFH	FFH
UK	FFH	FFH	FFH	FFH	FFH
Italy	100	F9H	1H	9	4
Austria	FFH	FFH	FFH	FFH	FFH
Belgium	30	150	0	30	4
Denmark	65	F4H	1H	65	4
Finland	FFH	FFH	FFH	FFH	FFH
Ireland	FFH	FFH	FFH	FFH	FFH
Norway	FFH	FFH	FFH	FFH	FFH
Sweden	40	00H	1H	40	3
Switzerland	40	EFH	1H	40	4
Portugal	FFH	FFH	FFH	FFH	FFH
Holland	55	EEH	2H	55	4
Spain	FFH	FFH	FFH	FFH	FFH
Israel	105	E8H	3H	105	4
USA	FFH	FFH	FFH	FFH	FFH
Asia	FFH	FFH	FFH	FFH	FFH
Hong Kong	FFH	FFH	FFH	FFH	FFH
South Africa	FFH	FFH	FFH	FFH	FFH
Australia	150	2CH	1H	100	1
New Zealand	FFH	FFH	FFH	FFH	FFH
Singapore	FFH	FFH	FFH	FFH	FFH
Malaysia	FFH	FFH	FFH	FFH	FFH

Country	807F20	807F21	807F22	807F23	807F24
France	0	0	FFH	FFH	FFH
Germany	200	0	FFH	FFH	FFH
UK	200	0	FFH	FFH	FFH
Italy	200	0	FFH	FFH	FFH
Austria	200	0	FFH	FFH	FFH
Belgium	200	0	FFH	FFH	FFH
Denmark	200	0	FFH	FFH	FFH
Finland	200	0	FFH	FFH	FFH
Ireland	200	0	FFH	FFH	FFH
Norway	200	0	FFH	FFH	FFH
Sweden	200	0	FFH	FFH	FFH
Switzerland	200	0	FFH	FFH	FFH
Portugal	200	0	FFH	FFH	FFH
Holland	200	0	FFH	FFH	FFH
Spain	150	0	FFH	FFH	FFH
Israel	200	0	FFH	FFH	FFH
USA	200	0	FFH	FFH	FFH
Asia	200	0	FFH	FFH	FFH
Hong Kong	200	0	FFH	FFH	FFH
South Africa	200	0	FFH	FFH	FFH
Australia	150	0	FFH	FFH	FFH
New Zealand	200	0	FFH	FFH	FFH
Singapore	200	0	FFH	FFH	FFH
Malaysia	200	0	FFH	FFH	FFH

Country	807F26	807F27	807F28	807F29	807F2A
France	FFH	FFH	FFH	FFH	25
Germany	FFH	FFH	FFH	FFH	12
UK	FFH	FFH	FFH	FFH	19
Italy	0H	30H	4H	00H	15
Austria	FFH	FFH	FFH	FFH	10
Belgium	FFH	FFH	FFH	FFH	25
Denmark	0H	50H	4H	00H	12
Finland	FFH	FFH	FFH	FFH	FFH
Ireland	FFH	FFH	FFH	FFH	25
Norway	FFH	FFH	FFH	FFH	10
Sweden	FFH	FFH	FFH	FFH	12
Switzerland	1H	20H	4H	00H	24
Portugal	FFH	FFH	FFH	FFH	FFH
Holland	FFH	FFH	FFH	FFH	12
Spain	FFH	FFH	FFH	FFH	8
Israel	0H	50H	4H	00H	12
USA	FFH	FFH	FFH	FFH	FFH
Asia	FFH	FFH	FFH	FFH	FFH
Hong Kong	FFH	FFH	FFH	FFH	FFH
South Africa	FFH	FFH	FFH	FFH	FFH
Australia	0H	38H	4H	00H	12
New Zealand	FFH	FFH	FFH	FFH	FFH
Singapore	FFH	FFH	FFH	FFH	FFH
Malaysia	FFH	FFH	FFH	FFH	FFH

Country	807F2B	807F2C	807F2D	807F2E	807F2F
France	25	FFH	FFH	FFH	FFH
Germany	12	24	24	7	24
UK	19	20	17	11	26
Italy	15	FFH	FFH	FFH	FFH
Austria	10	15	15	20	20
Belgium	25	8	8	FFH	FFH
Denmark	12	8	23	FFH	FFH
Finland	FFH	FFH	FFH	FFH	FFH
Ireland	25	37	37	18	18
Norway	0	25	0	FFH	FFH
Sweden	12	12	37	FFH	FFH
Switzerland	30	15	22	11	11
Portugal	FFH	FFH	FFH	FFH	FFH
Holland	12	25	25	FFH	FFH
Spain	8	FFH	FFH	FFH	FFH
Israel	12	24	24	FFH	FFH
USA	FFH	FFH	FFH	FFH	FFH
Asia	FFH	FFH	FFH	FFH	FFH
Hong Kong	FFH	FFH	FFH	FFH	FFH
South Africa	FFH	FFH	FFH	FFH	FFH
Australia	12	25	25	FFH	FFH
New Zealand	FFH	FFH	FFH	FFH	FFH
Singapore	FFH	FFH	FFH	FFH	FFH
Malaysia	FFH	FFH	FFH	FFH	FFH

Country	807F30	807F31	807F32	807F33	807F34
France	FFH	FFH	FFH	42H	4H
Germany	FFH	FFH	FFH	30H	FFH
UK	FFH	FFH	100	42H	FFH
Italy	FFH	FFH	FFH	40H	FFH
Austria	FFH	FFH	FFH	41H	FFH
Belgium	FFH	FFH	FFH	43H	00H
Denmark	FFH	FFH	FFH	42H	FFH
Finland	FFH	FFH	FFH	FFH	FFH
Ireland	FFH	FFH	35	43H	FFH
Norway	FFH	FFH	FFH	40H	FFH
Sweden	FFH	FFH	FFH	42H	FFH
Switzerland	8	30	FFH	51H	FFH
Portugal	FFH	FFH	FFH	FFH	FFH
Holland	FFH	FFH	FFH	41H	1H
Spain	FFH	FFH	FFH	41H	0H
Israel	FFH	FFH	FFH	41H	FFH
USA	FFH	FFH	FFH	FFH	FFH
Asia	FFH	FFH	FFH	FFH	FFH
Hong Kong	FFH	FFH	FFH	FFH	FFH
South Africa	FFH	FFH	FFH	FFH	FFH
Australia	FFH	FFH	FFH	41H	FFH
New Zealand	FFH	FFH	FFH	FFH	FFH
Singapore	FFH	FFH	FFH	FFH	FFH
Malaysia	FFH	FFH	FFH	FFH	FFH

Country	807F36	807F37	807F38	807F39	807F3A
France	4H	06H	75	58H	2
Germany	FFH	FFH	FFH	FFH	FFH
UK	FFH	FFH	FFH	FFH	FFH
Italy	FFH	FFH	FFH	FFH	FFH
Austria	FFH	FFH	FFH	FFH	FFH
Belgium	04H	00H	42H	E8H	3H
Denmark	FFH	FFH	FFH	FFH	FFH
Finland	FFH	FFH	FFH	FFH	FFH
Ireland	FFH	FFH	FFH	FFH	FFH
Norway	FFH	FFH	FFH	FFH	FFH
Sweden	FFH	FFH	FFH	FFH	FFH
Switzerland	FFH	FFH	FFH	FFH	FFH
Portugal	FFH	FFH	FFH	FFH	FFH
Holland	04H	00H	55	EEH	2H
Spain	4H	00H	75	80H	2H
Israel	FFH	FFH	FFH	FFH	FFH
USA	FFH	FFH	FFH	FFH	FFH
Asia	FFH	FFH	FFH	FFH	FFH
Hong Kong	FFH	FFH	FFH	FFH	FFH
South Africa	FFH	FFH	FFH	FFH	FFH
Australia	FFH	FFH	FFH	FFH	FFH
New Zealand	FFH	FFH	FFH	FFH	FFH
Singapore	FFH	FFH	FFH	FFH	FFH
Malaysia	FFH	FFH	FFH	FFH	FFH

Country	807F3B	807F3C	807F3D	807F3E	807F3F
France	75	2	0	0	FFH
Germany	FFH	FFH	00H	00H	FFH
UK	FFH	FFH	00H	00H	FFH
Italy	FFH	FFH	00H	00H	FFH
Austria	FFH	FFH	00H	00H	FFH
Belgium	16	33	00H	00H	FFH
Denmark	FFH	FFH	00H	00H	FFH
Finland	FFH	FFH	00H	00H	FFH
Ireland	FFH	FFH	00H	00H	FFH
Norway	FFH	FFH	00H	00H	FFH
Sweden	FFH	FFH	00H	00H	0H
Switzerland	FFH	FFH	00H	00H	FFH
Portugal	FFH	FFH	00H	00H	FFH
Holland	55	4	00H	00H	FFH
Spain	36	5	150	0	FFH
Israel	FFH	FFH	00H	00H	FFH
USA	FFH	FFH	00H	00H	FFH
Asia	FFH	FFH	00H	00H	FFH
Hong Kong	FFH	FFH	00H	00H	FFH
South Africa	FFH	FFH	00H	00H	FFH
Australia	FFH	FFH	00H	00H	FFH
New Zealand	FFH	FFH	00H	00H	FFH
Singapore	FFH	FFH	00H	00H	FFH
Malaysia	FFH	FFH	00H	00H	FFH

Country	807F41	807F42	807F43	807F44	807F45
France	FFH	FFH	FFH	FFH	FFH
Germany	FFH	FFH	FFH	FFH	FFH
UK	FFH	FFH	FFH	FFH	FFH
Italy	FFH	FFH	FFH	FFH	FFH
Austria	FFH	FFH	FFH	FFH	FFH
Belgium	FFH	FFH	FFH	FFH	FFH
Denmark	FFH	FFH	FFH	FFH	FFH
Finland	FFH	FFH	FFH	FFH	FFH
Ireland	FFH	FFH	FFH	FFH	FFH
Norway	FFH	FFH	FFH	FFH	FFH
Sweden	4H	00H	40	00H	1H
Switzerland	FFH	FFH	FFH	FFH	FFH
Portugal	FFH	FFH	FFH	FFH	FFH
Holland	FFH	FFH	FFH	FFH	FFH
Spain	FFH	FFH	FFH	FFH	FFH
Israel	FFH	FFH	FFH	FFH	FFH
USA	FFH	FFH	FFH	FFH	FFH
Asia	FFH	FFH	FFH	FFH	FFH
Hong Kong	FFH	FFH	FFH	FFH	FFH
South Africa	FFH	FFH	FFH	FFH	FFH
Australia	FFH	FFH	FFH	FFH	FFH
New Zealand	FFH	FFH	FFH	FFH	FFH
Singapore	FFH	FFH	FFH	FFH	FFH
Malaysia	FFH	FFH	FFH	FFH	FFH

Country	807F46	807F47	807F48	807F49	807F4A
France	FFH	FFH	0	0	67
Germany	FFH	FFH	00H	00H	50
UK	FFH	FFH	00H	00H	252
Italy	FFH	FFH	00H	00H	58
Austria	FFH	FFH	00H	00H	53
Belgium	FFH	FFH	00H	00H	61
Denmark	FFH	FFH	00H	00H	53
Finland	FFH	FFH	00H	00H	61
Ireland	FFH	FFH	00H	00H	255
Norway	FFH	FFH	00H	00H	61
Sweden	40	3	200	0	100
Switzerland	FFH	FFH	00H	00H	60
Portugal	FFH	FFH	00H	00H	61
Holland	FFH	FFH	00H	00H	58
Spain	FFH	FFH	00H	00H	75
Israel	FFH	FFH	00H	00H	61
USA	FFH	FFH	00H	00H	77
Asia	FFH	FFH	00H	00H	61
Hong Kong	FFH	FFH	00H	00H	61
South Africa	FFH	FFH	00H	00H	61
Australia	FFH	FFH	00H	00H	255
New Zealand	FFH	FFH	00H	00H	245
Singapore	FFH	FFH	00H	00H	61
Malaysia	FFH	FFH	00H	00H	61

Country	807F4B	807F4C	807F4D	807F4E	807F4F
France	65	35	50	40	0
Germany	61	41	44	46	46
UK	66	35	44	27	33
Italy	60	40	44	40	150
Austria	62	39	50	44	46
Belgium	67	33	50	43	26
Denmark	67	33	50	26	26
Finland	60	42	50	40	60
Ireland	67	33	50	30	33
Norway	59	41	50	33	33
Sweden	60	40	70	18	26
Switzerland	60	40	60	26	00H
Portugal	66	34	50	33	33
Holland	62	40	42	33	33
Spain	60	32	75	32	100
Israel	62	39	50	46	101
USA	60	41	74	46	101
Asia	66	34	50	36	101
Hong Kong	66	34	50	36	101
South Africa	66	34	50	36	101
Australia	68	32	70	36	101
New Zealand	66	34	50	36	101
Singapore	66	34	50	36	101
Malaysia	66	34	50	36	101

Country	807F50	807F51	807F52	807F53	807F54
France	70	70	12	4	34
Germany	90	90	0CH	5	34
UK	100	100	17	4	34
Italy	70	70	11	4	34
Austria	80	80	11	4	34
Belgium	70	70	11	4	34
Denmark	90	90	17	4	34
Finland	70	75	17	4	34
Ireland	70	70	17	4	34
Norway	70	70	17	4	34
Sweden	70	70	17	4	34
Switzerland	70	70	8	4	34
Portugal	70	70	17	4	34
Holland	70	70	17	4	34
Spain	70	140	12	4	34
Israel	90	90	17	4	34
USA	100	100	14	4	34
Asia	100	110	12	4	34
Hong Kong	100	110	12	4	34
South Africa	100	110	12	4	34
Australia	100	110	14	4	34
New Zealand	100	110	17	4	34
Singapore	100	110	12	4	34
Malaysia	100	110	12	4	34

Country	807F59	807F5A	807F5B	807F5C	807F5D
France	0	0	FFH	19H	FFH
Germany	15	90	FFH	00H	FFH
UK	15	90	F0H	10H	50
Italy	15	90	FFH	00H	FFH
Austria	15	100	FFH	00H	FFH
Belgium	100	90	FFH	00H	FFH
Denmark	15	90	F0H	9H	FFH
Finland	15	90	F9H	90H	100
Ireland	15	90	FFH	16H	FFH
Norway	25	90	F0H	95H	FFH
Sweden	15	90	F0H	09H	FFH
Switzerland	10	90	FFH	00H	FFH
Portugal	15	202	FFH	00H	FFH
Holland	15	90	FFH	9H	FFH
Spain	100	90	FFH	07H	FFH
Israel	15	90	FFH	00H	FFH
USA	00H	00H	FFH	FFH	FFH
Asia	00H	00H	FFH	FFH	FFH
Hong Kong	00H	00H	FFH	FFH	FFH
South Africa	00H	00H	FFH	FFH	FFH
Australia	00H	00H	FFH	FFH	FFH
New Zealand	00H	00H	FFH	FFH	FFH
Singapore	00H	00H	FFH	FFH	FFH
Malaysia	00H	00H	FFH	FFH	FFH

Country	807F5E	807F5F	807F65	807F66	807F72
France	80H	10H	FFH	16H	17
Germany	C0H	10H	FFH	FFH	23
UK	C0H	10H	FFH	FFH	20
Italy	81H	10H	FFH	FFH	18
Austria	C0H	10H	FFH	FFH	13
Belgium	04H	10H	FFH	FFH	21
Denmark	80H	10H	FFH	FFH	11H
Finland	40H	10H	FFH	FFH	16
Ireland	80H	10H	FFH	FFH	36
Norway	40H	10H	FFH	FFH	16
Sweden	40H	10H	FFH	FFH	17
Switzerland	80H	10H	FFH	FFH	16
Portugal	40H	10H	FFH	FFH	1AH
Holland	00H	10H	FFH	FFH	16
Spain	80H	10H	FFH	FFH	25
Israel	C0H	10H	FFH	FFH	16
USA	C0H	10H	FFH	FFH	13
Asia	C0H	10H	FFH	FFH	17
Hong Kong	C0H	10H	FFH	FFH	17
South Africa	C0H	10H	FFH	FFH	17
Australia	C0H	10H	FFH	FFH	14
New Zealand	C0H	10H	FFH	FFH	17
Singapore	C0H	10H	FFH	FFH	17
Malaysia	C0H	10H	FFH	FFH	17

Country	807F73	807F74	807F75	807F76	807F77
France	23	FFH	00H	2	15
Germany	43H	FFH	00H	1H	7
UK	84	FFH	00H	1	10
Italy	77	FFH	00H	2	10
Austria	54	FFH	00H	1	9
Belgium	72	FFH	00H	2	5
Denmark	43H	16	24	2	10
Finland	56	FFH	00H	2	25
Ireland	53H	FFH	00H	1	10
Norway	43H	FFH	00H	1	10
Sweden	43H	FFH	00H	1	5
Switzerland	43H	FFH	00H	3	1
Portugal	53H	16	24	1	0FH
Holland	52	FFH	00H	2	15
Spain	43H	FFH	00H	2	28H
Israel	43H	FFH	00H	2	14H
USA	83	FFH	00H	1	10
Asia	83	FFH	00H	1	10
Hong Kong	83	FFH	00H	1	10
South Africa	83	FFH	00H	1	10
Australia	83	FFH	00H	3	6
New Zealand	83	FFH	00H	3	10
Singapore	83	FFH	00H	1	10
Malaysia	83	FFH	00H	1	10

Country	807F78	807F79	807F7A	807F81	807F82
France	5	04H	1H	25	0
Germany	7	90H	1H	25	00H
UK	10	90H	1H	25	00H
Italy	10	90H	1H	25	00H
Austria	10	90H	1H	25	00H
Belgium	10	90H	1H	25	00H
Denmark	10	90H	1H	25	00H
Finland	25	90H	1H	25	00H
Ireland	10	90H	1H	25	00H
Norway	10	90H	1H	25	00H
Sweden	5	90H	1H	25	00H
Switzerland	1	90H	1H	25	00H
Portugal	0FH	90H	1H	25	00H
Holland	15	90H	1H	25	00H
Spain	28H	2CH	1H	25	00H
Israel	14H	90H	1H	25	00H
USA	10	90H	1H	25	00H
Asia	10	90H	1H	25	00H
Hong Kong	10	90H	1H	25	00H
South Africa	10	90H	1H	25	00H
Australia	6	90H	1H	25	00H
New Zealand	10	90H	1H	25	00H
Singapore	10	90H	1H	25	00H
Malaysia	10	90H	1H	25	00H

Country	807FA1	807FA2	807FA3	807FA4	807FA5
France	02H	00H	04H	00H	30
Germany	02H	00H	04H	00H	10
UK	02H	00H	04H	00H	10
Italy	02H	00H	04H	00H	10
Austria	02H	00H	04H	00H	10
Belgium	02H	00H	04H	00H	10
Denmark	02H	00H	04H	00H	10
Finland	02H	00H	04H	00H	10
Ireland	02H	00H	04H	00H	10
Norway	02H	00H	04H	00H	10
Sweden	02H	00H	04H	00H	10
Switzerland	02H	00H	04H	00H	10
Portugal	02H	00H	04H	00H	10
Holland	02H	00H	04H	00H	10
Spain	02H	00H	04H	00H	10
Israel	02H	00H	04H	00H	10
USA	02H	00H	04H	00H	10
Asia	02H	00H	04H	00H	10
Hong Kong	03H	00H	04H	00H	10
South Africa	03H	00H	04H	00H	10
Australia	02H	00H	04H	00H	10
New Zealand	02H	00H	04H	00H	10
Singapore	03H	00H	04H	00H	10
Malaysia	03H	00H	04H	00H	10

Country	807FA6	807FA7	807FA8	807FA9	807FAA
France	01H	60H	04H	00H	10
Germany	01H	60H	04H	00H	10
UK	01H	60H	04H	00H	10
Italy	01H	60H	04H	00H	10
Austria	01H	60H	04H	00H	10
Belgium	01H	60H	04H	00H	10
Denmark	01H	60H	04H	00H	10
Finland	01H	60H	04H	00H	10
Ireland	01H	60H	04H	00H	10
Norway	01H	60H	04H	00H	10
Sweden	01H	60H	04H	00H	10
Switzerland	01H	60H	04H	00H	10
Portugal	01H	60H	04H	00H	10
Holland	01H	60H	04H	00H	10
Spain	01H	60H	04H	00H	10
Israel	01H	60H	04H	00H	10
USA	01H	60H	04H	00H	10
Asia	01H	60H	04H	00H	10
Hong Kong	01H	E0H	04H	00H	10
South Africa	01H	E0H	04H	00H	10
Australia	01H	60H	04H	00H	10
New Zealand	01H	60H	04H	00H	10
Singapore	01H	E0H	04H	00H	10
Malaysia	01H	E0H	04H	00H	10

Country	807FAB	807FAC	807FAD	807FAE	807FAF
France	19H	96H	22H	FFH	0H
Germany	19H	96H	22H	FFH	0H
UK	19H	96H	22H	FFH	0H
Italy	19H	96H	22H	FFH	0H
Austria	19H	96H	22H	FFH	0H
Belgium	19H	96H	22H	FFH	0H
Denmark	19H	96H	22H	FFH	0H
Finland	19H	96H	22H	FFH	0H
Ireland	19H	96H	22H	FFH	0H
Norway	19H	96H	22H	FFH	0H
Sweden	19H	96H	22H	FFH	0H
Switzerland	19H	96H	22H	FFH	0H
Portugal	19H	96H	22H	FFH	0H
Holland	19H	96H	22H	FFH	0H
Spain	19H	96H	22H	FFH	0H
Israel	19H	96H	22H	FFH	0H
USA	19H	96H	22H	FFH	0H
Asia	19H	96H	22H	FFH	0H
Hong Kong	19H	96H	22H	FFH	0H
South Africa	19H	96H	22H	FFH	0H
Australia	19H	96H	22H	FFH	0H
New Zealand	19H	96H	22H	FFH	0H
Singapore	19H	96H	22H	FFH	0H
Malaysia	19H	96H	22H	FFH	0H

Country	807FB1	807FB2	807FB3	807FB4	807FB5
France	04H	00H	10	10	0
Germany	04H	00H	10	9	2
UK	04H	00H	10	8	00H
Italy	04H	00H	10	5	00H
Austria	04H	00H	10	5	00H
Belgium	04H	00H	10	5	00H
Denmark	04H	00H	10	9	00H
Finland	04H	00H	10	9	00H
Ireland	04H	00H	10	9	00H
Norway	04H	00H	10	10	00H
Sweden	04H	00H	10	9	00H
Switzerland	04H	00H	10	3	00H
Portugal	04H	00H	10	5	00H
Holland	04H	00H	10	5	00H
Spain	04H	00H	10	9	00H
Israel	04H	00H	10	12	00H
USA	04H	00H	10	9	0
Asia	04H	00H	10	5	00H
Hong Kong	04H	00H	10	6	0
South Africa	04H	00H	10	6	0
Australia	04H	00H	10	7	2
New Zealand	04H	00H	10	12	0
Singapore	04H	00H	10	6	0
Malaysia	04H	00H	10	6	0

Country	807FB6	807FB7	807FB8	807FB9	807FBD
France	0	10	0	0	0FH
Germany	00H	6	3	FEH	20H
UK	00H	8	2	0	0FH
Italy	00H	6	0	0	0FH
Austria	00H	6	0	0	0FH
Belgium	00H	6	0	0	0FH
Denmark	00H	10	0	0	0FH
Finland	00H	10	0	0	0FH
Ireland	00H	10	0	0	0FH
Norway	00H	9	2H	0	0FH
Sweden	00H	10	0	0	0FH
Switzerland	01H	5	1	FFH	0FH
Portugal	00H	6	0	0	0FH
Holland	00H	7	0	0	0FH
Spain	00H	10	0	0	0FH
Israel	00H	6	0	0	0FH
USA	0	9	0	0	10H
Asia	00H	6	0	0	0FH
Hong Kong	0	6	0	0	0FH
South Africa	0	6	0	0	0FH
Australia	00H	11	2	0	0FH
New Zealand	00H	8	0	0	0FH
Singapore	0	6	0	0	0FH
Malaysia	0	6	0	0	0FH

Country	807FDA				
France	53				
Germany	53				
UK	53				
Italy	53				
Austria	59				
Belgium	59				
Denmark	53				
Finland	53				
Ireland	53				
Norway	53				
Sweden	53				
Switzerland	92				
Portugal	53				
Holland	53				
Spain	80				
Israel	59				
USA	53				
Asia	47				
Hong Kong	53				
South Africa	53				
Australia	53				
New Zealand	53				
Singapore	53				
Malaysia	53			,	

4.4. DEDICATED TRANSMISSION PARAMETERS

Each Quick Dial Key and Speed Dial Code has four bytes of programmable parameters allocated to it. If transmissions to a particular machine often experience problems, store that terminal's fax number as a Quick Dial or Speed Dial, and adjust the parameters allocated to that number.

The programming procedure will be explained first. Then, the four bytes will be described.

4.4.1. Programming Procedure

1. Set bit 3 of System Bit Switch 04 to 1.
2. Either use Function 31 (for a Quick Dial number) or Function 32 (for a Speed Dial number)

   Example: Change the Parameters in Quick Dial 10.

3. Function 3 1 Yes
4. Press Quick Dial key 10.

   Note: When selecting Speed Dial 10 with Function 32, press 1 0 at the ten key pad.

5. Press Yes four times.
6. The settings for byte 0 are now displayed. Press a number from 0 to 7 corresponding to the bit that you wish to change.

   Example: Change bit 7 to 1: Press 7

7. To scroll through the parameter bytes, either:

   Select the next byte:

   or

   Select the previous byte:

   until the correct byte is displayed. Then go back to step 6.

8. After the setting is changed, press Yes .
9. To finish, press Function .
10. After finishing, reset bit 3 of System Bit Switch 04 to 0.

4.4.2. Parameters

The initial settings of the following parameters are all FF(H) - all the parameters are disabled.

Byte 0
FUNCTION AND COMMENTS
CCITT T1 time If the connection time to a particular terminal is longer than the NCU parameter setting , adjust this byte. The T1 time is the value stored in this byte (in hex code), multiplied by 1 second. **Range:** 1 to 127 s (01h to 7Fh) 00h or FFh - The local NCU parameter factory setting is used. Do not program a value between 80h and FEh.

Byte 1

	FUNCTION	**COMMENTS**
0 to 3	Tx level **Bit 3 2 1 0 Setting (dBm)** 0 0 0 0 0 0 0 0 1 -1 0 0 1 0 -2 0 0 1 1 -3 0 1 0 0 -4 : : 1 1 1 1 -15	If communication with a particular remote terminal often contains errors, the signal level may be inappropriate. Adjust the Tx level for communications with that terminal until the results are better.
4	Tx level setting **0:** Enabled **1:** Disabled (bits 0 to 4 must all be at 1 to disable)	**0:** When enabling the tx level setting, change this bit to 0, then change the settings of bits 0 through 3 above. **1:** When disabling the tx level setting, change all of the bits 0 through 4 to 1.
5 6	Cable equalizer **Bit 6 Bit 5 Setting** 0 0 None 0 1 Low 1 0 Medium 1 1 High	Use a higher setting if there is signal loss at higher frequencies because of the length of wire between the modem and the telephone exchange when calling the number stored in this Quick/Speed Dial. Also, try using the cable equalizer if one or more of the following symptoms occurs. • Communication error with error codes such as 0-20, 0-23, etc. • Modem rate fallback occurs frequently.
7	Cable equalizer setting **0:** Enabled **1:** Disabled (bits 5 to 7 must all be at 1 to disable)	**0:** When enabling the cable equalizer setting, change this bit to 0, then change the settings of bits 5 and 6 above. **1:** When disabling the cable equalizer setting, change all of the bits 5, 6 and 7 to 1.

Byte 2

	FUNCTION	COMMENTS
0 to 3	Initial Tx modem rate **Bit 3 2 1 0 Setting (bps)** 0 0 0 0 Not used 0 0 0 1 2,400 0 0 1 0 4,800 0 0 1 1 7,200 0 1 0 0 9,600 0 1 0 1 12,000 (reserved) 0 1 1 0 14,400 (reserved) 1 1 1 1 Setting disabled Other settings: Not used	If training with a particular remote terminal always takes too long, the initial modem rate may be too high. Reduce the initial Tx modem rate using these bits. **Note:** 12,000 and 14,400 bps speeds are not available with this machine.
4 to 7	Not used	Do not change the settings.

Byte 3

	FUNCTION	COMMENTS
0	Not used	Do not change the settings.
1	Not used	
2 **3**	DIS/NSF detection method **Bit 3 Bit 2 Setting** 0 0 First DIS or NSF 0 1 Second DIS or NSF 1 0 First DIS or NSF 1 1 Setting disabled	**(0, 1):** Use this setting if echoes on the line are interfering with the set-up protocol at the start of transmission. The machine will then wait for the second DIS or NSF before sending DCS or NSS.
4	Not used	Do not change the settings.
5	Compression modes available in transmit mode **0:** MH only **1:** All available compression modes	This bit determines the capabilities that are informed to the other terminal during transmission.
6 **7**	ECM during transmission **Bit 7 Bit 6 Setting** 0 0 Disabled 0 1 Enabled 1 0 Disabled 1 1 Setting disabled	For example, if ECM is switched on but is not wanted when sending to a particular terminal, use the setting of (0, 0).

4.5. SERVICE RAM ADDRESSES

⚠CAUTION

Do not change the settings which are marked as “Not used” or “Read only.”

800000(H) - RAM Reset Level 1
Change the data at this address to 00 (H), then switch the machine off and on to reset all the system settings.

⚠CAUTION

Before using this RAM, print the settings of all the system parameters (System Parameter List).

800001 to 800004(H) - ROM version (Read only)
800001(H) - Revision number (BCD)
800002(H) - Year (BCD)
800003(H) - Month (BCD)
800004(H) - Day (BCD)

800006 to 800016(H) - Machine’s serial number (17 digits - ASCII)

800018(H) - Total program checksum (low)
800019(H) - Total program checksum (high)

80001A(H) - Boot program checksum (low)
80001B(H) - Boot program checksum (high)

80001C(H) - Main program checksum (low)
80001D(H) - Main program checksum (high)

80001E(H) - RDS program update counter (Hex)

800020 to 80003F(H) - System bit switches
800040 to 80004F(H) - Scanner bit switches
800050 to 80005F(H) - Printer bit switches
800060 to 80007F(H) - Communication bit switches
800080 to 80008F(H) - G3 bit switches

8000A0(H) - User parameter switch 00
Bit 0: Stamp home position 0: Disabled, 1: Enabled
Bits 1 and 2: Scanning contrast home position

Bit	2	1	Setting
	0	0	Normal
	0	1	Lighten
	1	0	Darken

Bit 3: Do not adjust
Bits 4 and 5: Scanning resolution home position

Bit	5	4	Setting
	0	0	Standard
	0	1	Detail
	1	0	Fine

Bit 6: Transmission mode home position 0: Memory tx, 1: Immediate tx
Bit 7: Halftone home position 0: Disabled, 1: Enabled

8000A1(H) - User parameter switch 01
Bit 0: Auto Image Density home position 0: Off, 1: On
Bit 1: Auto Paper Select home position 0: Off, 1: On
Bit 2: Copy/Fax key home position 0: Off, 1: On
Bits 3 to 6: Not used
Bit 7: Settings return to home position after transmission 0: Disabled, 1: Enabled

8000A2(H) - User parameter switch 02
Bit 0: Not used
Bit 1: Center mark printing on received copies 0: Disabled, 1: Enabled
Bit 2: Not used
Bit 3: TSI inclusion in transmitted messages 0: Disabled, 1: Enabled
Bits 4 to 7: Not used

8000A3(H) - User parameter switch 03 (Automatic report printout)
Bit 0: Transmission result report (memory transmissions) 0: Off, 1: On
Bit 1: Not used
Bit 2: Memory storage report 0: Off, 1: On
Bit 3: Polling reserve report (polling reception) 0: Off, 1: On
Bit 4: Polling result report (polling reception) 0: Off, 1: On
Bit 5: Transmission result report (immediate transmissions) 0: Off, 1: On
Bit 6: Not used
Bit 7: TCR (Journal) 0: Off, 1: On

8000A4(H) - User parameter switch 04
Bit 0: Not used
Bits 1 to 6: Not used
Bit 7: Inclusion of a sample image on reports 0: Off, 1: On

8000A5(H) - User parameter switch 05
Bit 0: Substitute reception 0: Off, 1: On
Bit 1: Memory reception if no RTI or CSI received 0: Possible, 1: Impossible
Bits 2 and 3: Not used
Bits 4 and 5: Not used
Bits 6 and 7: Fusing lamp control during energy saver mode

Bit	7	6	Setting
	0	0	Lamp off
	0	1	Power saver standby tempreature (80 °C)
	1	0	Standby temperature (145 °C)
	1	1	Not used

8000A6(H) - User parameter switch 06
Bit 0: TTI default 0: Off, 1: On
Bit 1 to 7: Not used

8000A7(H) - User parameter switch 07
Bits 0 to 2: Not used
Bit 3: Automatic reduction before transmission 0: Off, 1: On
Bits 4 to 7: Not used

8000A8(H) - User parameter switch 08
Bit 0 and 1: Not used
Bits 2 and 3: Authorized reception

Bit 3	2	Setting
X	0	Disabled
0	1	Faxes from senders whose RTIs/CSIs are specified for this feature are accepted.
1	1	Faxes from senders whose RTIs/CSIs are not specified for this feature are accepted.

Bits 4 to 7: Not used

8000A9(H) - User parameter switch 09
Bits 0 to 7: Not used

8000AA(H) - User parameter switch 10
Bits 0 to 6: Not used
Bit 7: Halftone type 0: Error diffusion, 1: Dither

8000AB(H) - User parameter switch 11
Bits 0 to 7: Not used

8000AC(H) - User parameter switch 12
Bits 0 and 1: Not used
Bit 2: Toner saving mode 0: Disabled, 1: Enabled
Bits 3 and 4: Printout image density (Fax mode)

Bit 4	3	Setting
0	0	Normal
0	1	Lighten
1	0	Darken
1	1	Not used

Bits 5 to 7: Not used

8000AD(H) - User parameter switch 13
Bits 0 and 1: PSTN access method from behind a PABX

Bit 1	0	Setting
0	0	PSTN
0	1	Loop start
1	0	Ground start
1	1	Flash start

8000AE - 8000AF(H) - User parameter switches 14 to 15
Not used

8000B1(H) - Maximum number of copies 1 - 99 (BCD)
8000B2(H) - Center erase width 1 - 50 mm (BCD)
8000B3(H) - Border erase width 1 - 50 mm (BCD)

8000B9(H) - User function 62 settings
Bit 0: Night timer 0: Disabled, 1: Enabled
Bits 1 to 3: Not used
Bit 4: RDS operation 0: Not acceptable, 1: Acceptable for the limit specified by system switch 03
Bits 5 and 6: Not used
Bit 7: Daylight saving time 0: Disabled, 1: Enabled

8000BA(H) - User function 62 settings
Bit 0: Not used
Bit 1: Dialing type 0: Pulse dialing (10 pps), 1: Tone (DTMF) dialing
Bits 2 to 7: Not used

8000BB(H) - PSTN access number for loop start

Access number	Hex value to program (BCD)
0	F0
⇩	⇩
0	F0
00	00
⇩	⇩
99	99

8000C8 to 8000DB(H) - RTI (Max. 20 characters - ASCII) - **Note 1**
8000DC to 8000EF(H) - CSI (Max. 20 characters - ASCII)
8000F0 to 80010F(H) - TTI (Max. 32 characters - ASCII) - **Note 1**
800110(H) - Number of CSI characters (Hex)

Note 1: If the number of characters are less than the maxumum (20 for RTI, 32 for TTI), add a stop code (FF[H]) after the last character.

800111 to 80011F(H) - Service station's fax number (Service function 13)

800120 to 80012E(H) - Own fax number (User function 61)

80012F(H) - ID code (low - Hex)
800130(H) - ID code (high - Hex)

800140 to 800146(H) - Last power off time (Read only)
800140(H) - Year (BCD)
800141(H) - Month (BCD)
800142(H) - Day (BCD)
800143(H) - 00: Monday, 01: Tuesday, 02: Wednesday, ... , 06: Sunday
800144(H) - Hour
800145(H) - Minute
800146(H) - Second

800150(H) - Installed equipment (Read only)
Bits 0-2: Not used
Bit 3: ADF 0: Not installed, 1: Installed
Bit 4: 100 sheet cassette 0: Not installed, 1: Installed
Bits 5-7: Not used

800151(H) - Installed equipment
Bit 0: Not used
Bit 1: Printer interface 0: Not installed, 1: Installed
Bits 2-6: Not used
Bit 7: IC page memory card 0: Not installed, 1: Installed

The following counters are listed on the System Parameter List. The names used on this report are given in parentheses below.

800158 to 80015A(H) - Tx counter (TX)

Address	High	Low
800158(H)	Tens digit	Unit digit
800159(H)	Thousands digit	Hundrets digit
80015A(H)	Millions digit	Ten thousands digit

Note: The following counters have the same data format as above.

80015B to 80015D(H) - Rx counter (RX)

80015E to 800160(H) - Scan counter (SCN)

800161 to 800163(H) - Print counter (PRT)

800164 to 800166(H) - Printer interface output counter (PRN)

800167 to 800169(H) - Paper feed counter (standard cassette) (UPPER CASSETTE)

80016D to 80016F(H) - Paper feed counter (100-sheet cassette) (OPEN CASSETTE)

800170 to 800172(H) - Paper feed counter (bypass feed) (BY-PASS)

800173 to 800175(H) - ADF counter (ADF)

800176 to 800178(H) - Book scan counter (BOOK)

800179 to 80017B(H) - ADF scan total jam counter (DOC. JAM)

80017C to 80017E(H) - Printer total jam counter (COPY JAM)

80017F to 800181(H) - Paper jam counter (standard cassette) (UPPER CST JAM)

800185 to 800187(H) - Paper jam counter (optional 100 sheet cassette) (OPEN CST JAM)

800188 to 80018A(H) - Bypass jam counter (BY-PASS JAM)

80018B to 80018D(H) - Fusing exit jam counter (EJECT JAM)

80018E to 800190(H) - Registration jam counter (PAPER JAM)

800191 to 800193(H) - PM counter (PM)

800194 to 800196(H) - PM call interval (default 60,000) (PM DEFAULT)

800197 to 800199(H) - Copy counter (COPY)

80019A to 80019C(H) - OPC (master drum) counter (PCU)

80019D to 80019F(H) - CTM counter (TONER)

8001D5 to 8001E4(H) - Excessive jam call parameters (Refer to section 2.3.2 for details.)

8001E5 to 8001E7(H) - OPC (master drum) replacement interval (default: 30,000 prints)
The machine asks the user to replace the drum at this interval, if bit 3 of system bit switch 04 is 0.

8001F1 to 80021A(H) - Night timer period (User function 71)
8001F1 to 8001F3(H) - Setting #1 for Monday
8001F4 to 8001F6(H) - Setting #2 for Monday
8001F7 to 8001F9(H) - Setting #1 for Tuesday
8001FA to 8001FC(H) - Setting #2 for Tuesday
8001FD to 8001FF(H) - Setting #1 for Wednesday
800200 to 800202(H) - Setting #2 for Wednesday
800203 to 800205(H) - Setting #1 for Thursday
800206 to 800208(H) - Setting #2 for Thursday
800209 to 80020B(H) - Setting #1 for Friday
80020C to 80020E(H) - Setting #2 for Friday
80020F to 800211(H) - Setting #1 for Saturday
800212 to 800214(H) - Setting #2 for Saturday
800215 to 800217(H) - Setting #1 for Sunday
800218 to 80021A(H) - Setting #2 for Sunday

Program format
First byte - Hour (BCD)
Second byte - Minute (BCD)
Third byte - 00(H): Timer start time, 01(H): Timer end time

800245 to 80024C(H) - Last RDS operation (Read only)
800245(H) - Year (BCD)
800246(H) - Month (BCD)
800247(H) - Day (BCD)
800248(H) - 00: Monday, 01: Tuesday, 02: Wednesday, ... , 06: Sunday
800249(H) - Hour
80024A(H) - Minute
80024B(H) - Second

80024D(H) - Daylight saving time setting (User function 62)

800250(H) - Transmission monitor volume 00 - 07(H)
800251(H) - Reception monitor volume 00 - 07(H)
800252(H) - On Hook monitor volume 00 - 07(H)
800254(H) - Buzzer volume 00 - 07(H)
800255(H) - Key acknowledgement tone volume 00 - 07(H)

800256 to 80025A(H) - Periodic service call parameters (Refer to section 2.3.2 for details)

800261 to 800263(H) - Effective term of automatic service calls (Refer to section 2.3.2 for details)

8002A5 to 8002A6(H) - ADF mode: scan top margin adjustment
8002A7 to 8002A8(H) - ADF mode: scan bottom margin adjustment
Refer to section 5.12 for details.

8002A9 to 8002AA(H) - Book mode: scan top margin adjustment
8002AB(H) - Book mode: scan bottom margin adjustment
Refer to section 5.12 for details.

80034D(H) - Print top margin (standard cassette)
800352(H) - Print top margin (optional 100 sheet cassette)
800353(H) - Print top margin (bypass feeder)

800357(H) - Print left margin (standard cassette)
80035C(H) - Print left margin (optional 100 sheet cassette)
80035D(H) - Print left margin (bypass feeder)
Refer to section 5.12 for details about these parameters.

800363(H) - Print bottom margin (bypass feeder)
Refer to section 5.12 for details about this parameter.

8003C1(H) - Initial Toner Supply
Bit 3: Initial toner supply 0: Off, 1: On
Whenever the development unit is replaced, do the following procedure.
1. Make sure that a new development unit, drum, and CTM are correctly installed.
2. Turn on the machine and change this bit to 1.
3. Turn off the machine.
4. Turn on the machine. The machine starts filling up the empty development unit hopper with new toner. (This bit is reset to zero automatically.)
5. Make test copies or test patterns to check the print quality.

80033C(H) - Fusing unit failure details
01(H) - The fusing lamp temperature stayed above 175 °C while printing.
02(H) - The fusing lamp temperature did not reach 150 °C before starting printing.
03(H) - The fusing lamp temperature did not go down to 80 °C while in standby mode (when fusing lamp OFF was selected for power saver mode)
04(H) - The fusing lamp temperature did not go down to 80 °C while in standby mode (when fusing lamp Standby (80 °C) was selected for power saver mode)
05(H) - The fusing lamp temperature stayed below 80 °C while in standby mode (when fusing lamp Standby (80 °C) was selected for power saver mode)
07(H) - The fusing lamp temperature came below 140 °C during printing
08(H) - The fusing lamp temperature exceeded 250 °C
09(H) - A fusing thermistor error was detected

When a service call was caused by a fusing unit failure (codes 01 - 09):
After fixing the problem, reset the data at this address to 00(H), then restart the machine to clear the service call. (Refer to address 8003B5(H) for other hardware failures.)

80033D(H) - Excessive jam alarm
Bit 3: Scanner excessive jam alarm 1: An alarm has occurred
Bit 4: Printer excessive jam alarm 1: An alarm has occurred
Either or both of these bits will change to 1 when an excessive jam alarm occurs. Reset each bit to 0 when you have solved the problem. The machine will not be able to detect excessive jams in future if you do not reset these bits.

8003AD(H) - Sensor status (standard cassette and internal printer mechanism)
Bit 0 to 3: Paper size sensor
(**Note**: Available paper sizes depend on the country for which the machine is designed.)

$$\begin{pmatrix} Bit\,0 \\ Bit\,1 \\ Bit\,2 \\ Bit\,3 \end{pmatrix} = \begin{pmatrix} 1 \\ 0 \\ 0 \\ 0 \end{pmatrix} : HLT\ sideways \quad \begin{pmatrix} 0 \\ 1 \\ 0 \\ 0 \end{pmatrix} : A5\ sideways \quad \begin{pmatrix} 1 \\ 1 \\ 0 \\ 0 \end{pmatrix} : B5\ sideways \quad \begin{pmatrix} 0 \\ 0 \\ 1 \\ 0 \end{pmatrix} : LT\ lengthwise \quad \begin{pmatrix} 1 \\ 0 \\ 1 \\ 0 \end{pmatrix} : A4\ lengthwise$$

$$\begin{pmatrix} Bit\,0 \\ Bit\,1 \\ Bit\,2 \\ Bit\,3 \end{pmatrix} = \begin{pmatrix} 0 \\ 1 \\ 1 \\ 0 \end{pmatrix} : F/F4\ lengthwise \quad \begin{pmatrix} 1 \\ 1 \\ 1 \\ 0 \end{pmatrix} : Legal\ lengthwise \quad \begin{pmatrix} 0 \\ 0 \\ 0 \\ 1 \end{pmatrix} : B4\ lengthwise \quad \begin{pmatrix} 1 \\ 0 \\ 0 \\ 1 \end{pmatrix} : B5\ lengthwise \quad \begin{pmatrix} 1 \\ 1 \\ 1 \\ 1 \end{pmatrix} : Cassette\ not\ installed$$

Bit 4: Paper end sensor 1: Paper end
Bit 5: Registration sensor 1: Paper present
Bit 6: Fusing exit sensor 1: Paper present
Bit 7: Standard cassette availability 0: Available, 1: Not available (jam, no paper, etc.)

8003B2(H) - Sensor status (optional 100 sheet cassette)
Bit 0 to 3: Paper size sensor
(**Note**: Available paper sizes depend on the country for which the machine is designed.)

$$\begin{pmatrix} Bit\,0 \\ Bit\,1 \\ Bit\,2 \\ Bit\,3 \end{pmatrix} = \begin{pmatrix} 1 \\ 0 \\ 0 \\ 0 \end{pmatrix} : HLT\ sideways \quad \begin{pmatrix} 0 \\ 1 \\ 0 \\ 0 \end{pmatrix} : A5\ sideways \quad \begin{pmatrix} 1 \\ 1 \\ 0 \\ 0 \end{pmatrix} : B5\ sideways \quad \begin{pmatrix} 0 \\ 0 \\ 1 \\ 0 \end{pmatrix} : LT\ lengthwise \quad \begin{pmatrix} 1 \\ 0 \\ 1 \\ 0 \end{pmatrix} : A4\ lengthwise$$

$$\begin{pmatrix} Bit\,0 \\ Bit\,1 \\ Bit\,2 \\ Bit\,3 \end{pmatrix} = \begin{pmatrix} 0 \\ 1 \\ 1 \\ 0 \end{pmatrix} : F/F4\ lengthwise \quad \begin{pmatrix} 1 \\ 1 \\ 1 \\ 0 \end{pmatrix} : Legal\ lengthwise \quad \begin{pmatrix} 0 \\ 0 \\ 0 \\ 1 \end{pmatrix} : B4\ lengthwise \quad \begin{pmatrix} 1 \\ 0 \\ 0 \\ 1 \end{pmatrix} : B5\ lengthwise \quad \begin{pmatrix} 1 \\ 1 \\ 1 \\ 1 \end{pmatrix} : Cassette\ not\ installed$$

Bit 4: Paper end sensor 1: Paper end
Bit 5: Not used
Bit 6: Not used
Bit 7: Cassette availability 0: Available, 1: Not available (jam, no paper, etc.)

8003B3(H) - Sensor status (bypass feed)
Bit 0 to 3: Not used
Bit 4: Paper in the bypass feeder 1: Paper not present
Bit 5: Bypass feed sensor 1: Paper present
Bit 6: Not used
Bit 7: Bypass feed availability 0: Available, 1: Not available (jam, no paper, etc.)

8003B5(H) - Details of the service call (hardware error)
01(H) - The fusing lamp temperature stayed above 175 °C while printing.
02(H) - The fusing lamp temperature did not reach 150 °C before starting printing.
03(H) - The fusing lamp temperature did not go down to 100 °C while in standby mode (when fusing lamp OFF and fusing standby temperature 80 °C were selected for power saver mode)
04(H) - The fusing lamp temperature did not go down to 100 °C while in standby mode (when power saver standby temperature 80 °C was selected for power saver mode), or The fusing lamp temperature did not go down to 145 °C while in standby mode (when fusing standby temperature 145 °C were selected for power saver mode)
05(H) - The fusing lamp temperature stayed below standby temperature (80 °C or 145 °C) while in standby mode (when fusing lamp OFF was not selected).
07(H) - The fusing lamp temperature came below 140 °C while printing
08(H) - The fusing lamp temperature exceeded 250 °C
09(H) - A fusing thermistor error was detected
11(H) - Charge leak current was detected while the charge corona unit was activated
12(H) - Charge leak current was detected while the charge corona unit was not activated
21(H) - The laser synchronization signal was not detected during printing
31(H) - Polygonal mirror motor startup error
32(H) - Polygonal mirror motor error during printing
41(H) - Main motor startup error
42(H) - Main motor error during printing
71(H) - Scanner home position was not detected correctly. Refer to section 6.3 for more details.

When a service call was caused by a fusing lamp failure (codes 01 - 09):
The same code is stored at address 80033C(H).
After fixing the problem, reset the data at address 80033C(H) to 00(H), then restart the machine to clear the service call.

When a service call was caused by another hardware failure (codes 11 - 71):
If the problem remains after restarting the machine (power off/on), fix the hardware problem. The service call condition is cleared after power up.

8003FD to 800426 (H) - Scanner Video Processing Parameters
See section 5.11.4 for details.

80183D to 8019BD(H) - Latest 64 error codes (Read only)

One error record consists of 6 bytes of data.

First error record start address - 80183D(H)
Second error record start address - 801844(H)
Third error record start address - 80184A(H)
: : :
64th error record start address - 8019B8(H)

The format is as follows:
1st byte - Minute (BCD)
2nd byte - Hour (BCD)
3rd byte - Day (BCD)
4th byte - Month (BCD)
5th byte - Error code (low) [If the error code is 1-23, 23 is stored here.]
6th byte - Error code (high) [If the error code is 1-23, 01 is stored here.]

802043 to 802255(H) - Latest 10 error communication records

One error communication record consists of 53 bytes. The format is as follows:

1st byte - Header
Bit 0: Communication result 0: OK, 1: NG
Bit 1: Document jam 1: Occurred
Bits 2 - 3: Not used
Bit 4: Technical data printout instead of personal codes 0: No, 1: Yes
Bit 5: Type of technical data 0: Rx level, 1: Measure of error rate
Bit 6: Error report 0: Not printed, 1: Printed
Bit 7: Data validity 0: Not valid, 1: Valid

2nd to 5th bytes - Date and time when the communication started
2nd byte - Month (BCD)
3rd byte - Day (BCD)
4th byte - Hour (BCD)
5th byte - Minute (BCD)

6th and 7th bytes - Communication time
6th byte - Minutes (BCD)
7th byte - Seconds (BCD)

8th byte - Number of pages transmitted or received (Hex)

9th and 10th bytes - Personal code or number of total/burst error lines
If bit 4 of the 1st byte is 0:
9th byte - Personal code (low - BCD)
10th byte - Personal code (high - BCD)
If bit 4 of the 1st byte is 1:
9th byte - Number of total error lines (Hex)
10th byte - Number of burst error lines (Hex)

11th byte - File number (low - Hex)
12th byte - File number (high - Hex)

13th and 14th bytes - Rx level or measure of error rate
If bit 5 of the 1st byte is 0:
13th byte - Rx level (low - Hex)
14th byte - Rx level (high - Hex)
If bit 4 of the 1st byte is 1:
13th byte - Measure of error rate (low - Hex)
14th byte - Measure of error rate (high - Hex)

15th byte - Final modem rate
Bits 0 to 2: Final modem speed

$$\begin{pmatrix} Bit\,0 \\ Bit\,1 \\ Bit\,2 \end{pmatrix} = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} : 2.4k \quad \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix} : 4.8k \quad \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix} : 7.2k \quad \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix} : 9.6k \quad \begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix} : 12.0k \quad \begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix} : 14.4k$$

Bit 3: Not used
Bits 4 to 6: Final modem type

$$\begin{pmatrix} Bit\,4 \\ Bit\,5 \\ Bit\,6 \end{pmatrix} = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} : V.27ter \quad \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix} : V.29 \quad \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix} : V.33$$

Bit 7: Not used

16th byte to 35th byte - Remote terminal's ID (RTI, TSI or CSI) (ASCII)

36th byte - Communication mode #1
Bits 0 - 1: Resolution used

$$\begin{pmatrix} Bit\,0 \\ Bit\,1 \end{pmatrix} = \begin{pmatrix} 1 \\ 0 \end{pmatrix} : Standard, \quad \begin{pmatrix} 0 \\ 1 \end{pmatrix} : Detail, \quad \begin{pmatrix} 1 \\ 1 \end{pmatrix} : Fine$$

Bit 2: Not used
Bit 3: ECM 0: Off, 1: On
Bits 4 to 7: Communication mode used

$$\begin{pmatrix} Bit\,4 \\ Bit\,5 \\ Bit\,6 \\ Bit\,7 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} : Normal \quad \begin{pmatrix} 1 \\ 0 \\ 0 \\ 0 \end{pmatrix} : Not\ used \quad \begin{pmatrix} 0 \\ 1 \\ 0 \\ 0 \end{pmatrix} : Polling \quad \begin{pmatrix} 1 \\ 1 \\ 0 \\ 0 \end{pmatrix} : Not\ used$$

$$\begin{pmatrix} Bit\,4 \\ Bit\,5 \\ Bit\,6 \\ Bit\,7 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 1 \\ 0 \end{pmatrix} : Not\ used \quad \begin{pmatrix} 1 \\ 0 \\ 1 \\ 0 \end{pmatrix} : \begin{matrix} Automatic \\ Service\ Call \end{matrix}$$

37th byte - Communication mode #2
Bit 0: Tx or Rx 0: Tx, 1: Rx
Bit 1: Reduction in Tx 0: Not reduced, 1: Reduced
Bit 2: Not used
Bit 3: Send later transmission 0: Not used, 1: Used
Bit 4: Transmission from 0: ADF, 1: Memory
Bits 5 to 7: Not used

38th byte - Number of errors duing communication (Hex)

39th to 41st byte - 1st error code and page number where the error occurred
    39th byte - Page number where the error occurred (Hex)
    40th byte - Error code (low - BCD)
    41st byte - Error code (high - BCD)
42th to 44th byte - 2nd error code and page number where the error occurred
45th to 47th byte - 3rd error code and page number where the error occurred
48th to 50th byte - 4th error code and page number where the error occurred
51tst to 53rd byte - 5th error code and page number where the error occurred

F80006 to F8000E(H) - ROM version number (BCD) - Read only

F80006 to F8000E(H) - ROM release date (BCD) - Read only

F80006 to F8000E(H) - ROM part number and suffix (ASCII) - Read only

4.6. SPECIAL TOOLS AND LUBRICANTS

- Flash/SRAM data copy harness (P/N: H5159100)
- Launa Oil - 40 (P/N: 54429103) for scanner guide shaft

4.7. PM TABLE

Scanner

Item	30K	60K	90K	1 year	Notes
Exposure Glass	C (user)	C (user)	C (user)	C	Soft cloth and water
Platen Cover	C (user)	C (user)	C (user)	C	Soft cloth and water
Shading Plate	C	C	C	C	Soft cloth and water

ADF

Item	30K	60K	90K	1 year	Notes
Exposure Glass	C (user)	C (user)	C (user)	C	Soft cloth and water
R0 and R2 Rollers	C (user)	C (user)	C (user)	C	Soft cloth and water
R1 Roller	C	C	C	C	
Shading Plate	C (user)	C (user)	C (user)	C	Soft cloth and water
ADF Roller Assy	R	R	R	C	Soft cloth and water
Separation Roller	R	R	R	C	Soft cloth and water

Printer

Item	30K	60K	90K	1 year	Notes
Paper Feed Roller				C	Soft cloth and water
Registration Roller	C (user)	C (user)	C (user)	C	Soft cloth and water
Fusing Thermistor		R			
Hot Roller Strippers		R			
Hot Roller		R			
Pressure Roller (Fusing)		R			
Cleaning Pad	R (user) Replaced when a new CTM (toner cassette) is installed.				A cleaning pad is enclosed in the master unit.
Transfer Roller		R			Dry cloth
Development Unit		R			

100 Sheet Cassette (Optional Kit)

Item	10K	30K	60K	1 year	Notes
Feed Roller				C	Soft cloth and water

C: Clean, R: Replace

5. REPLACEMENT AND ADJUSTMENT

⚠WARNING

The machine contains a laser beam generator. Laser beams can cause permanent eye damage. Do not open the laser unit or look along the laser beam path while the main power is on.

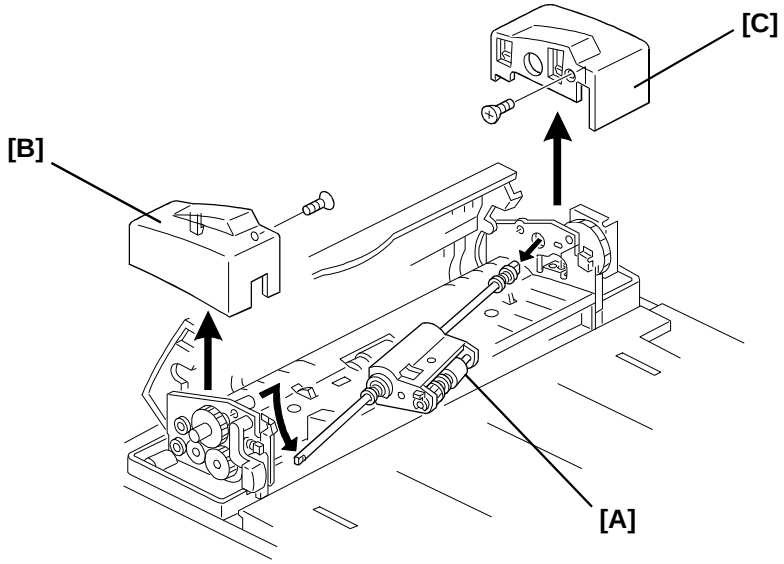
⚠CAUTION

Before starting disassembly, be sure to print all message files in the SAF memory. Then, turn off the main switch and disconnect the power cord for safety.

Lithium Battery: The danger of explosion exists if a battery of this type is incorrectly replaced. Replace only with the same or an equivalent type recommended by the manufacturer. Discard used batteries in accordance with the manufacturer's instructions.

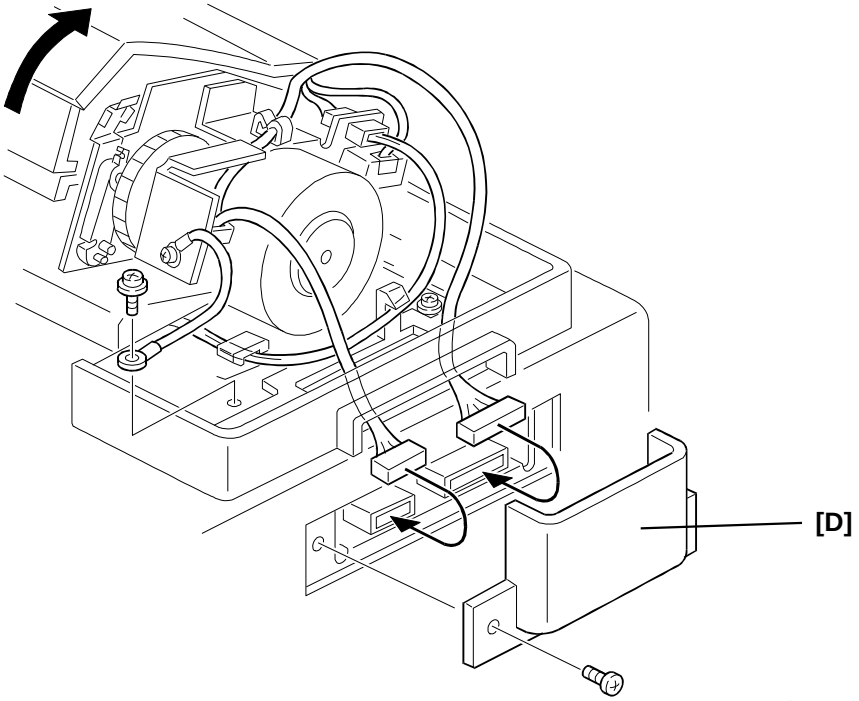
5.1. EXTERIOR

5.1.1. ADF



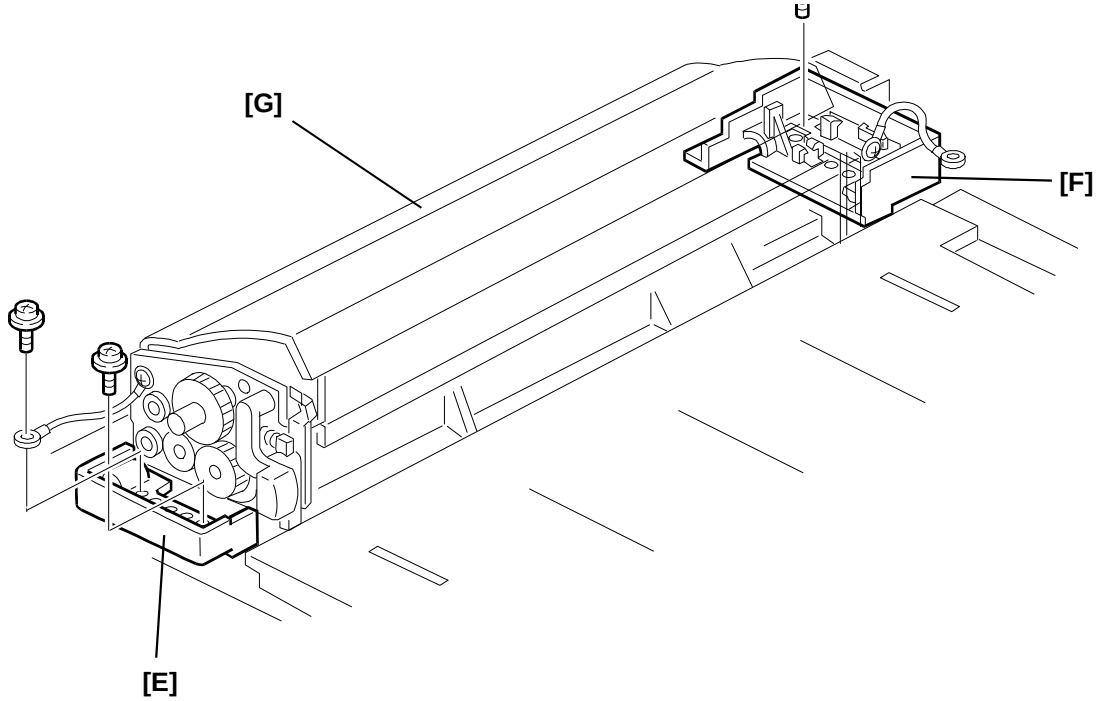
H521R515.wmf

First, remove the ADF roller assembly [A].
A: ADF Roller Assembly
B: ADF Upper Front Cover (1 screw, 1 hook)
C: ADF Upper Rear Cover (1 screw, 2 hooks)



H521R516.wmf

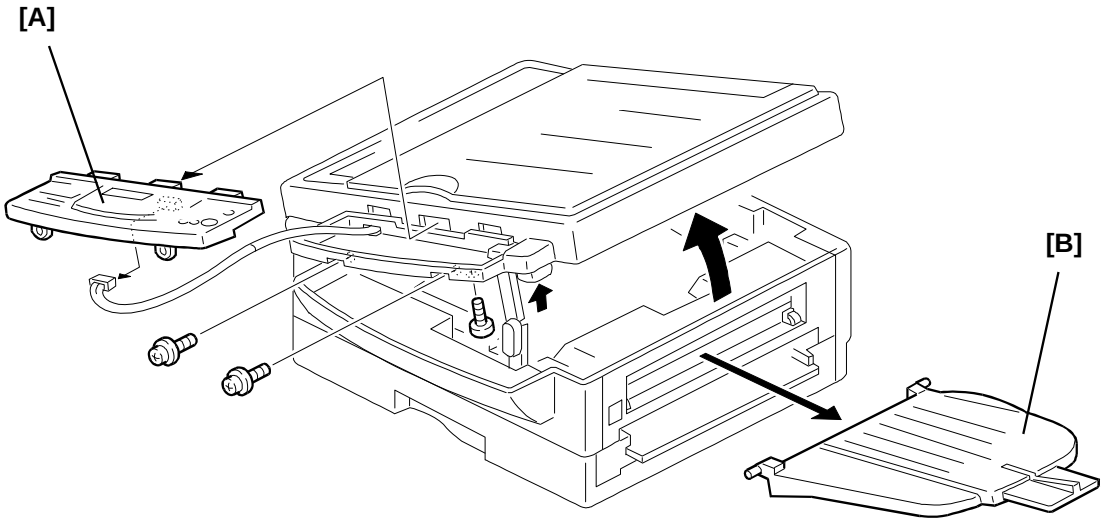
Remove the connector cover, then remove the harness and a ground wire.
D: Connector Cover (1 screw)



H521R517.wmf

E: ADF Lower Front Cover (2 screws, 1 grounding wire)
F: ADF Lower Rear Cover (2 screws, 1 grounding wire)
G: ADF Unit (2 connectors)

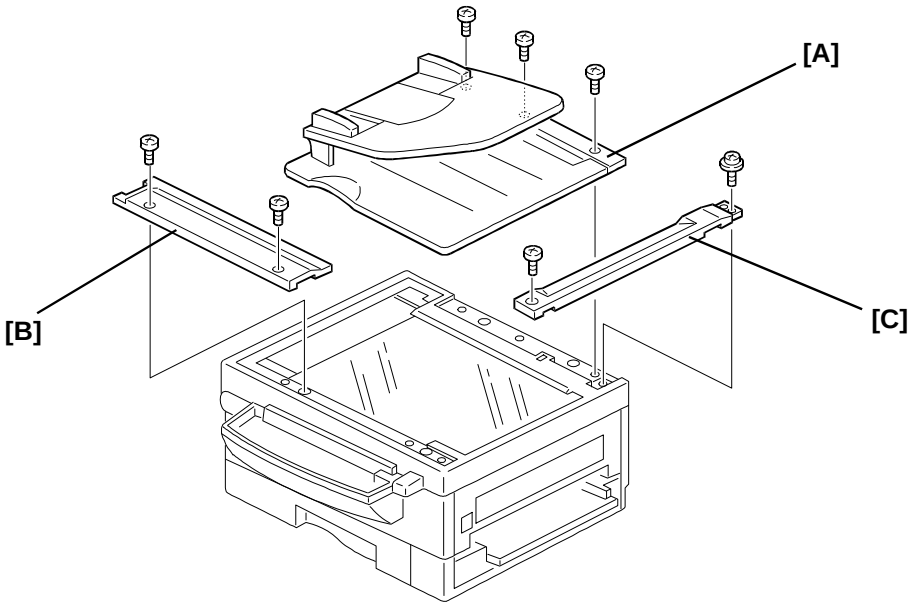
5.1.2. Operation Panel and Copy Tray



H521R501.wmf

A: Operation Panel Assembly (2 tapping screws)
B: Copy Tray

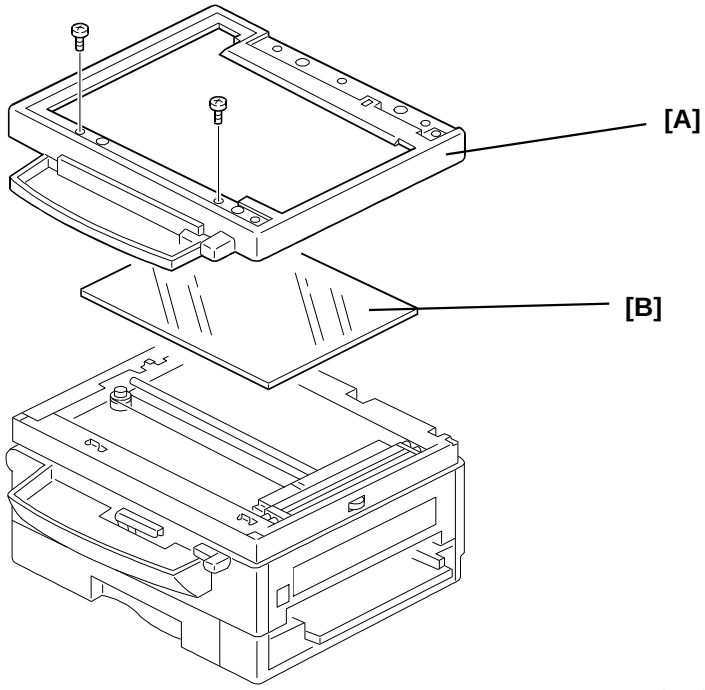
5.1.3. Platen Cover and Original Scales



H521R014.wmf

A: Platen Cover (3 tapping screws)
B: Horizontal Scale (2 silver screws)
C: Vertical Scale (1 silver screw, 1 screw)

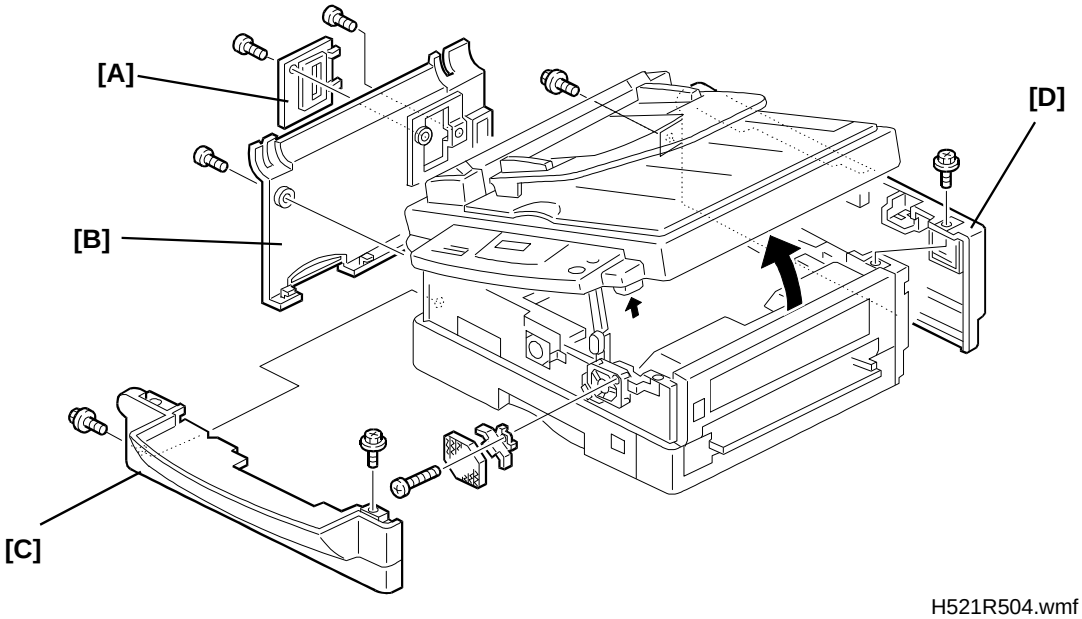
5.1.4. Top Cover and Exposure Glass



H521R015.wmf

A: Top Cover (2 screws)
B: Exposure Glass

5.1.5. Left, Front, and Rear Cover

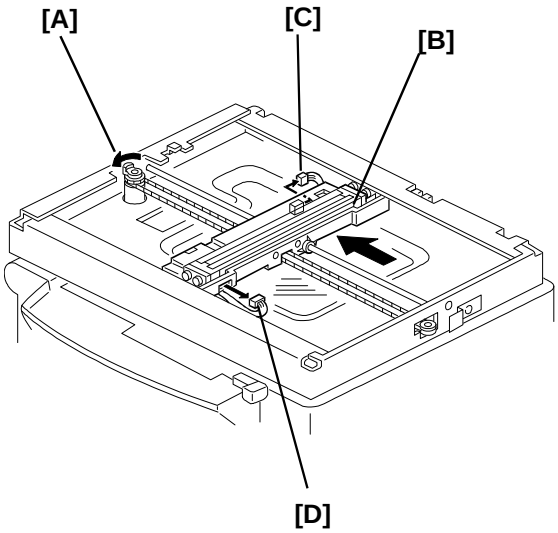


H521R504.wmf

A: NCU Cover (1 silver screw), B: Left Cover (2 black screws)
C: Front Cover (2 black screws, 2 positioning hooks)
D: Rear Cover (2 black screws, 3 positioning hooks)

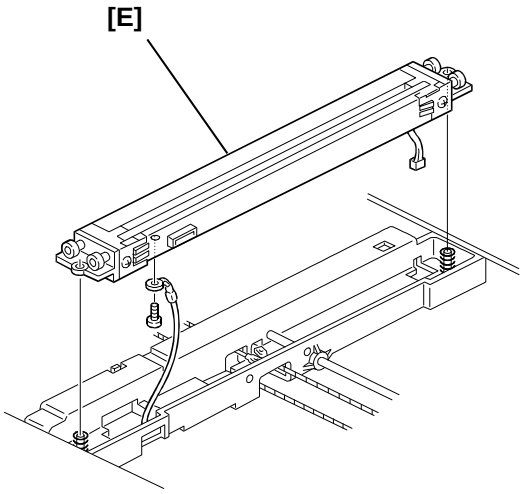
5.2. SCANNER

5.2.1. Contact Image Sensor



H521R016.wmf

Turn the gear [A] anti-clockwise to move the image sensor [B] to the middle of scanning path.
Then disconnect harnesses [C] and [D].



H521R017.wmf

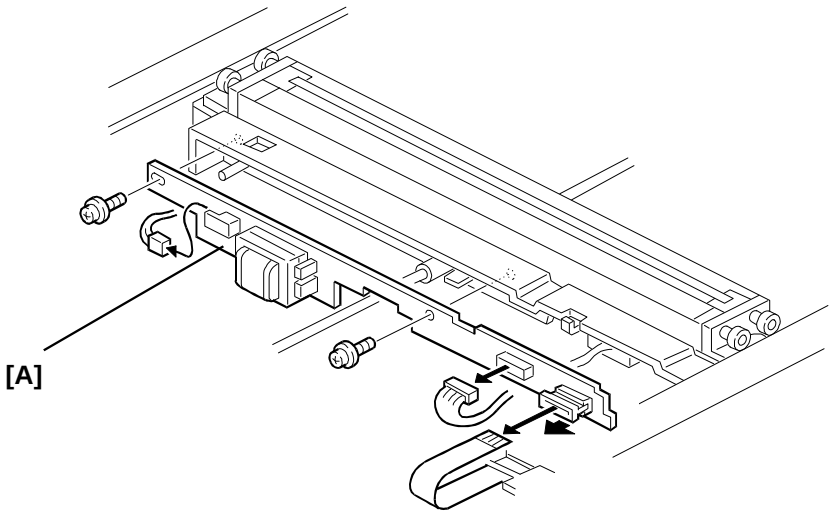
E: Contact Image Sensor Assembly (1 tapping screw, 1 grounding wire)

After replacing the image sensor, do the following.

1. Reset the sensor clock signal using service function 10-4.
   (See section 4-1-19; the clock is reset automatically when this function is used.)
2. Make some test copies using book scanner and ADF mode.
   A blank copy might be made when using the ADF after replacing the image sensor. Refer to section 6.1.1 for more details.

Note for the scanner guide shaft replacement
If you replace the scanner guide shaft, put Launa Oil 40 on all surfaces of the shaft (P/N: 54429103 - Launa Oil 40).

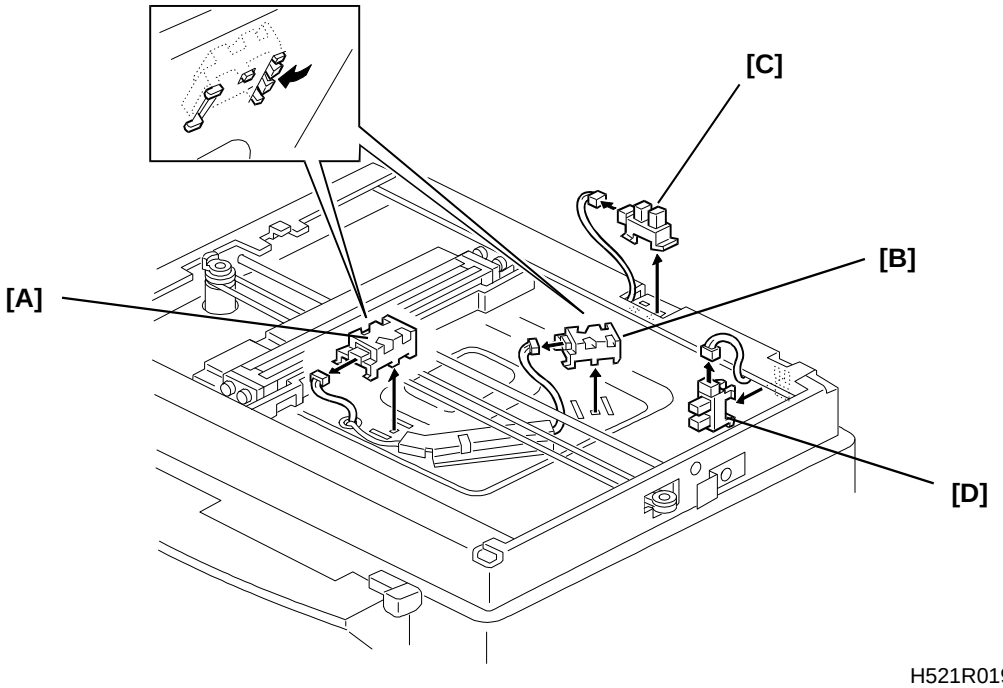
5.2.2. Fluorescent Lamp Stabilizer



H521R018.wmf

A: Fluorescent Lamp Stabilizer (2 tapping screws, 3 connectors)

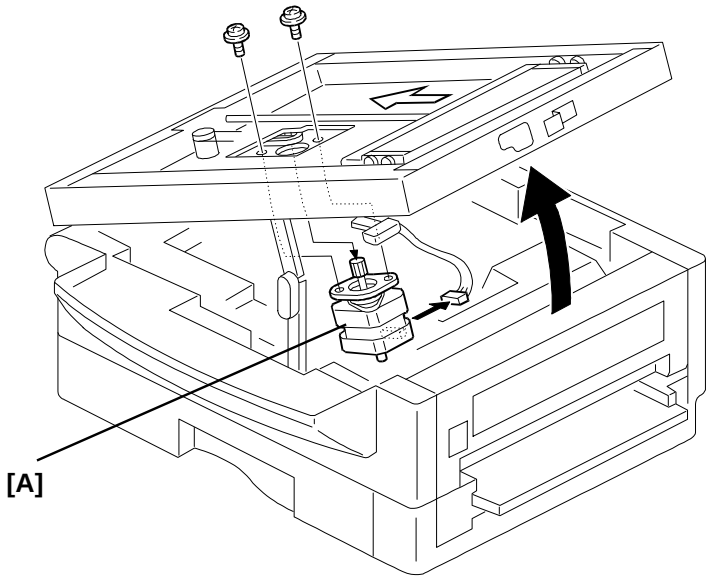
5.2.3. Original Size, Platen Cover, and Scanner Home Position Sensors



H521R019.wmf

A: Original Length Sensor (1 connector, 6 hooks)
B: Original Width Sensor (1 connector, 6 hooks)
C: Platen Cover Sensor (1 connector, 3 hooks)
D: Scanner Home Position Sensor (1 connector, 3 hooks)

5.2.4. Scanner Motor

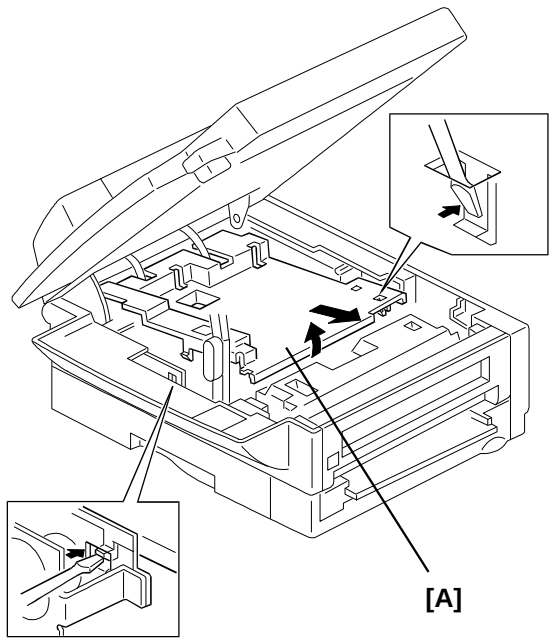


H521R020.wmf

A: Scanner Motor (2 screws, 1 connector, 1 timing belt)

5.3. LASER PRINTING COMPONENTS

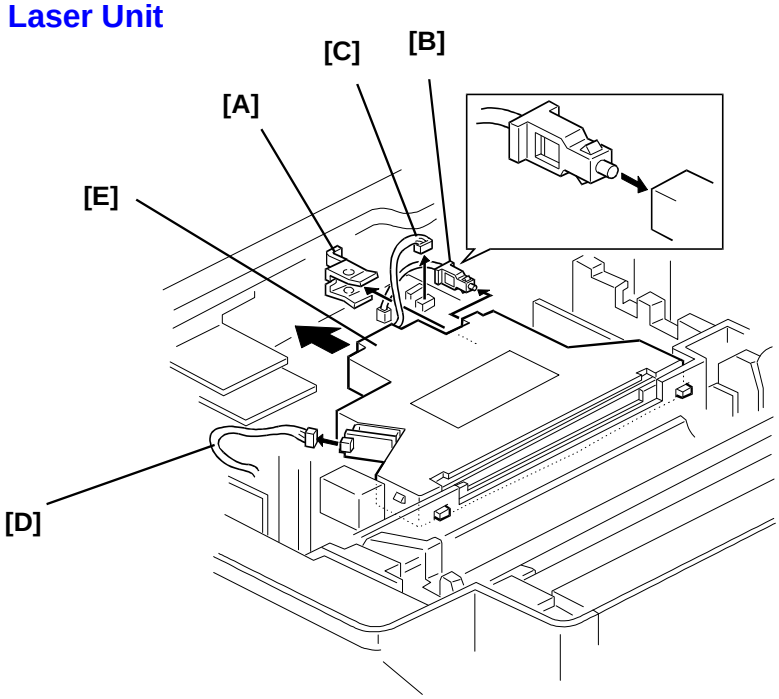
5.3.1. Inner Cover



H521R511.wmf

A: Inner Cover (3 hooks)

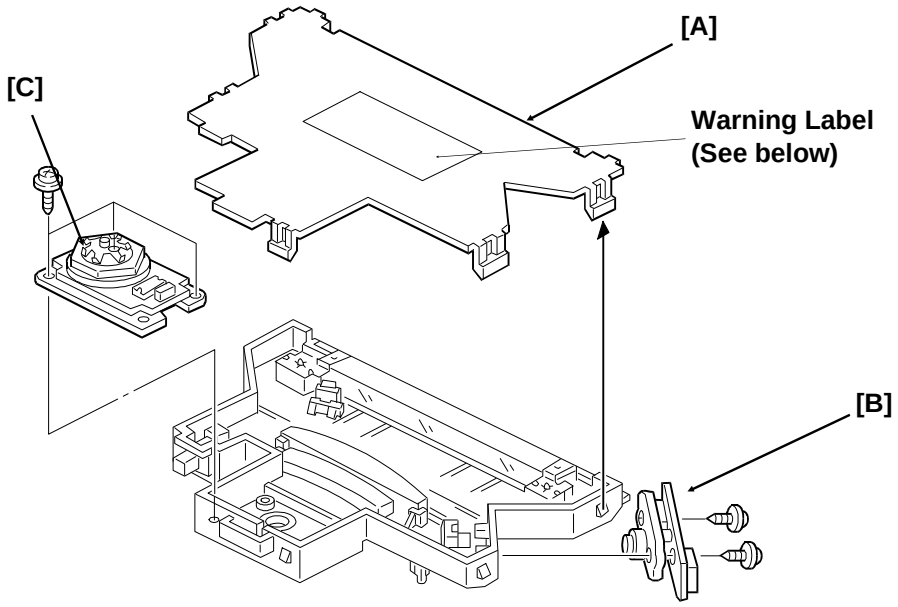
5.3.2. Laser Unit



H521R022.wmf

First, remove the clip [A] and harnesses [B], [C], and [D], then remove the Laser Unit [E].

5.3.3. Laser Diode Unit and Hexagonal Mirror Motor

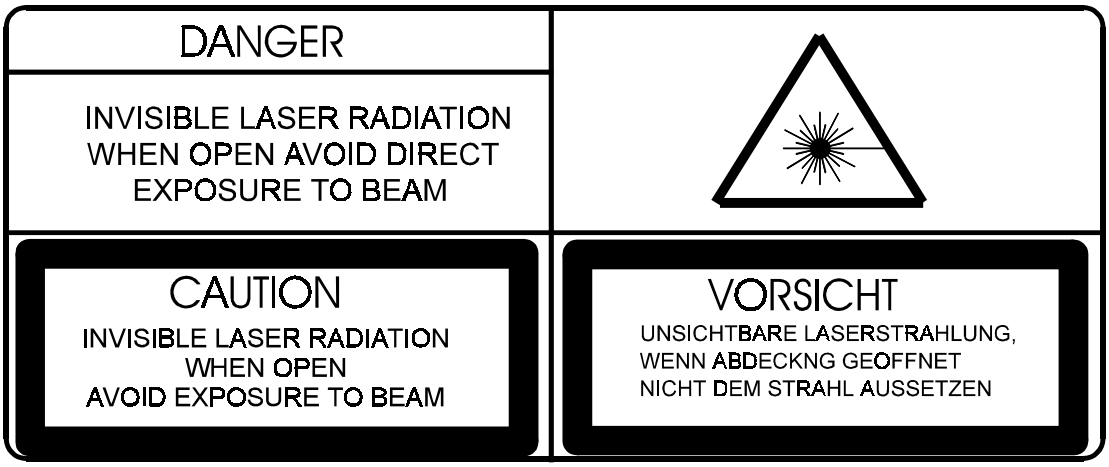


H521R620.wmf

A: Laser Unit Cover (7 hooks)
B: Laser Diode Unit (2 tapping screws)
C: Hexagonal Mirror Motor (3 tapping screws)

⚠WARNING

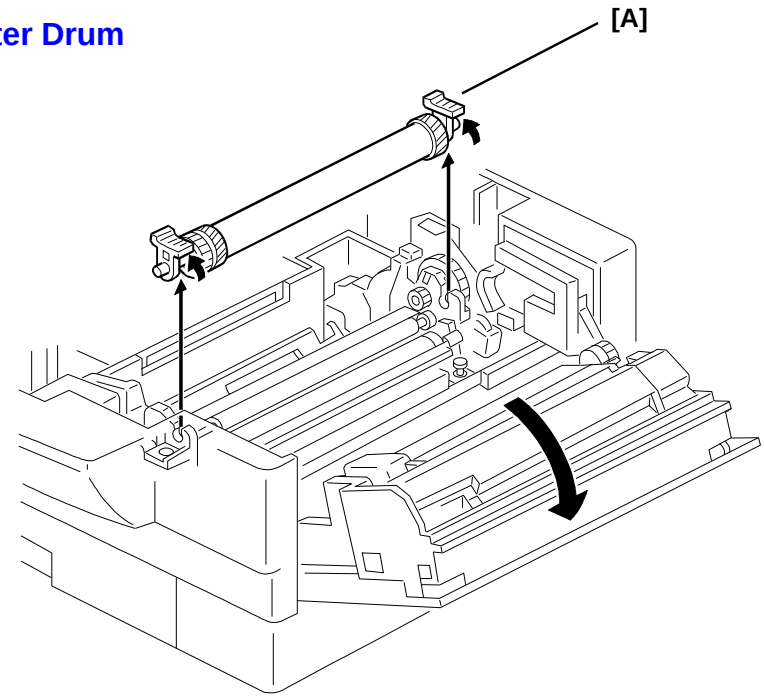
Laser beams can cause permanent eye damage. Do not open the laser unit or look along the laser beam path while the main power is on.



H521R647.wmf

5.4. DEVELOPMENT

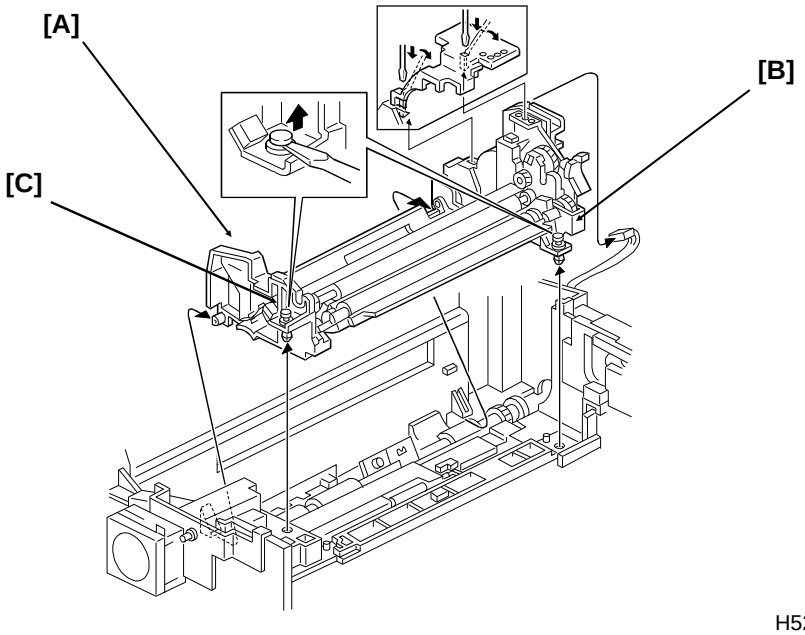
5.4.1. Master Drum



H521R023.wmf

A: Master Drum

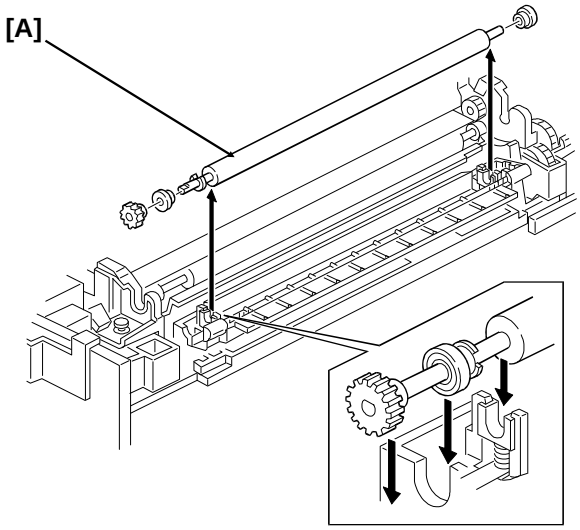
5.4.2. Development Unit



H521R621.wmf

Release the clips [B] and [C], then remove the development unit [A].
A: Development Unit (2 clips, 1 connector)

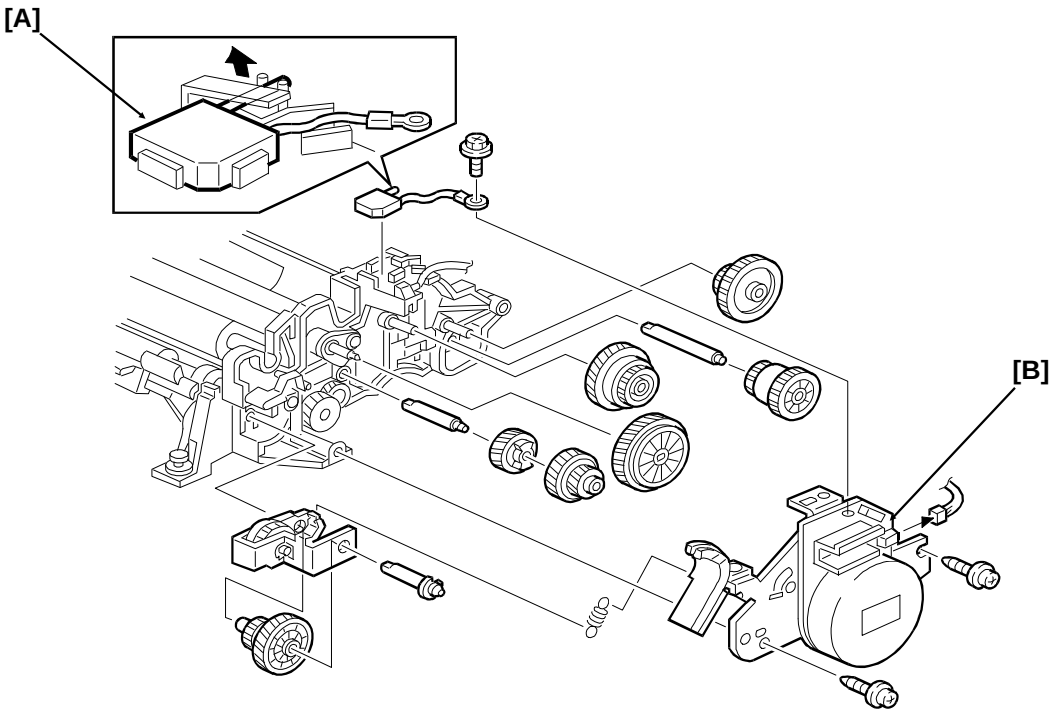
5.4.3. Transfer Roller



H521R622.wmf

A: Transfer Roller (1 gear, 2 spacers)

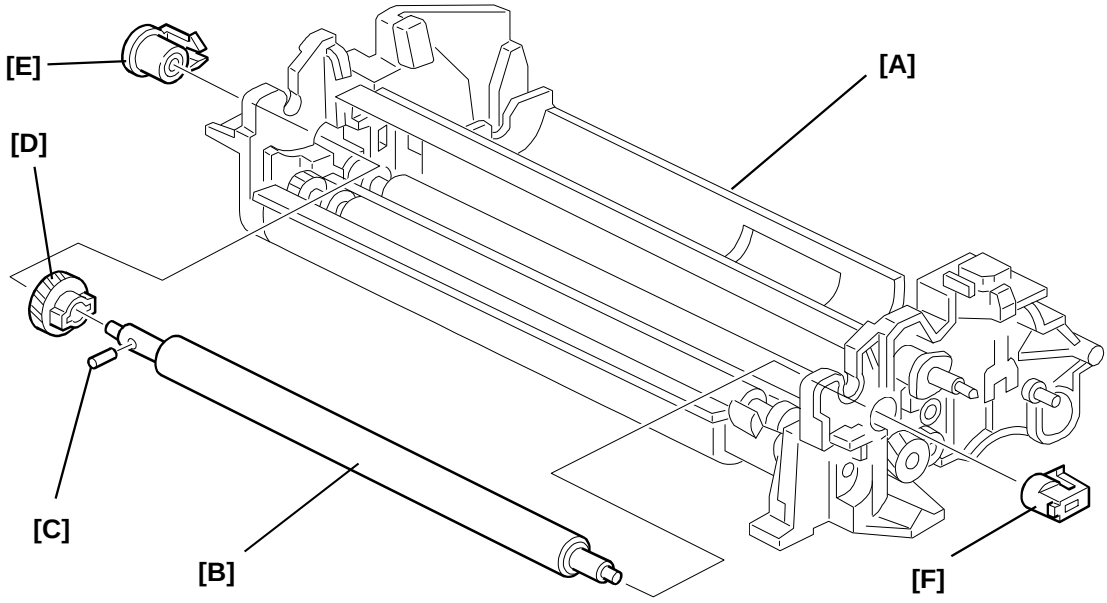
5.4.4. Main Motor and Gears



H521R623.wmf

First, remove the zener diode [A], then remove the main motor assembly [B].
Note: Once the main motor assembly is removed, the gears and the shafts will come off the unit easily.
A: Zener Diode (1 screw)
B: Main Motor Assembly (2 tapping screws, 1 connector, 1 spring)

5.4.5. Replacing the Development Unit



H521R646.wmf

The spare development unit does not come with the development roller installed. So, assemble the roller first as shown above just before replacing the unit.
A: Development Unit
B: Development Roller (Rubber)
C: Pin
D: Development Roller Gear
E, F: Bushings

After every 60,000 prints, the following parts have to be replaced:

- Development unit [A]
- Development roller [B] (A development roller comes with the parts [C] through [F]. Check for the assembly part number of [B] through [F] in the parts catalog.)
- Transfer roller (refer to section 5.4.3)
- Zener diode (refer to section 5.4.4)

A new development unit does not come with the transfer roller unit, main motor and gears, development roller [B], or the parts labelled [C] to [F] in the above illustration. To install a new development unit, do the following:

1. Install a new development roller into the new development unit as shown above.
2. Install a new transfer roller, a new zener diode, a main motor, and gears as described in the previous sections.

Continued on the next page

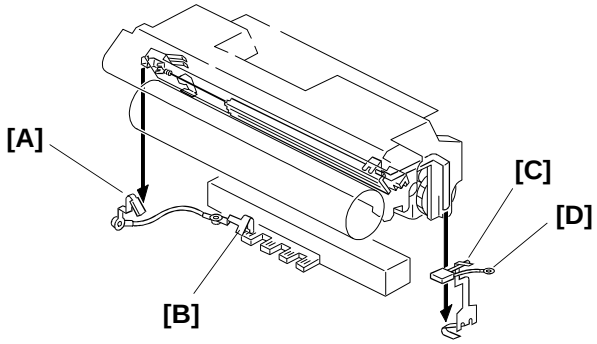
3. Check the electrical resistance of the following.

Charge bias terminals/Zener diode

H521R656.wmf

A: Bias terminal to the CTM
B: Bias terminal from the power pack
C, D: Zener diode terminals

Criteria
A - B: 0 Ω
C - D: The resistance varies depending on the voltage applied between the terminals.

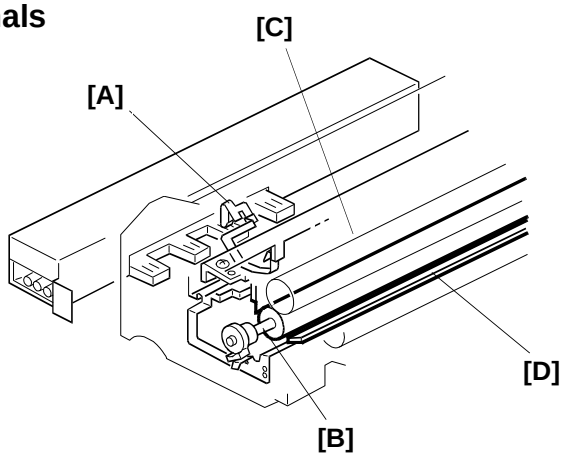


Toner application roller bias terminals

H521R657.wmf

A: Bias terminal from the power pack
B: Toner application roller shaft
C: Toner metering blade
D: Bias brush

Criteria
A - B: Less than 1 kΩ
A - C: Less than 1 kΩ
A - D: Less than 1 kΩ

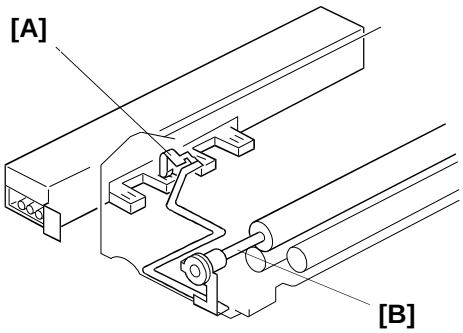


Development roller bias terminals

H521R658.wmf

A: Bias terminal from the power pack
B: Development roller shaft

Criteria
A - B: Less than 1 kΩ



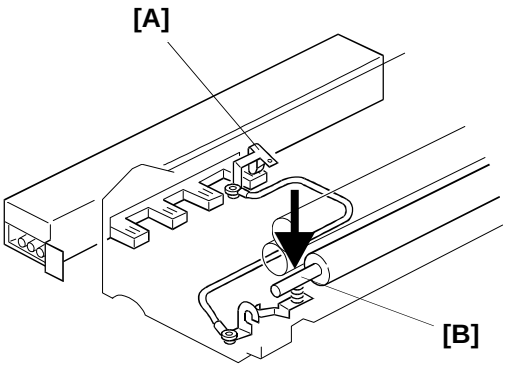
Transfer roller bias terminals

H521R659.wmf

A: Bias terminal from the power pack
B: Transfer roller shaft

Criteria
A - B: Less than 10 kΩ

Note: Check the resistance while pushing the roller shaft down to the roller holder.



Continued on the next page

4. Install the new development unit into the machine.
5. Install the drum and CTM, and check that the following points are connected to frame ground.
   - Drum shaft
   - Main motor bracket
   - Antistatic brush on the transfer roller unit

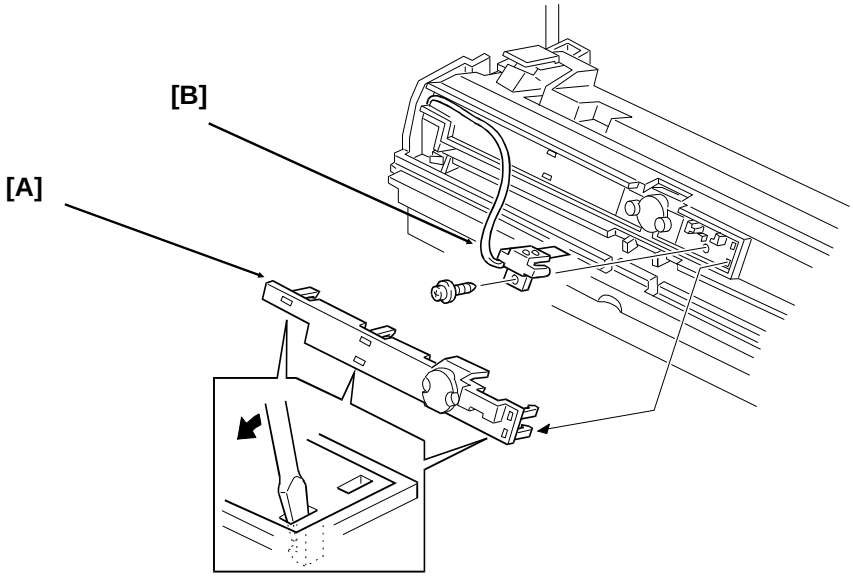
Initial Toner Supply

After installing a new development unit, do the following:

1. Set bit 3 of RAM address 8003C1 to 1.
2. Turn of the machine and wait for 10 seconds.
3. Turn on the machine.
4. The machine will supply new toner to the development unit.

5.5. FUSING

5.5.1. Thermistor

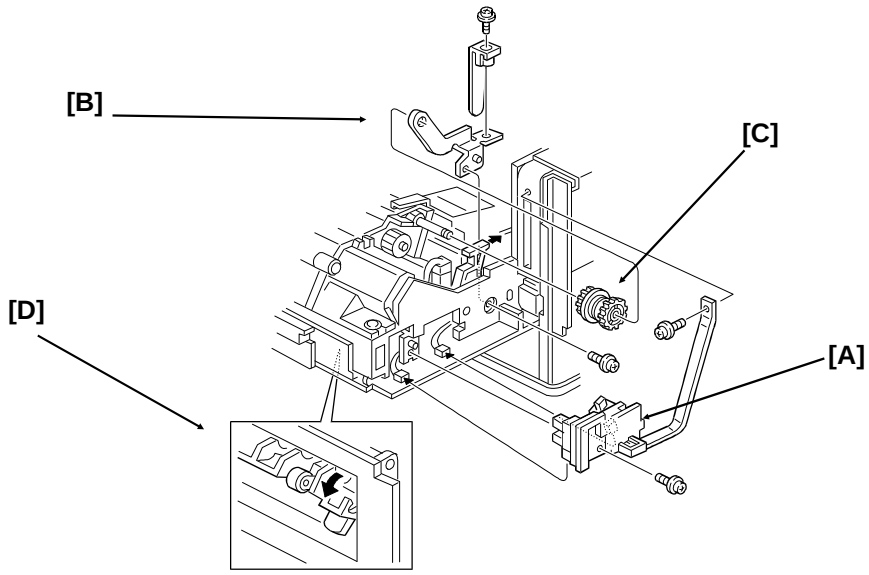


H521R036.wmf

A: Thermistor Cover (6 hooks), B: Thermistor (1 tapping screw, 1 connector)

5.5.2. Fusing Unit

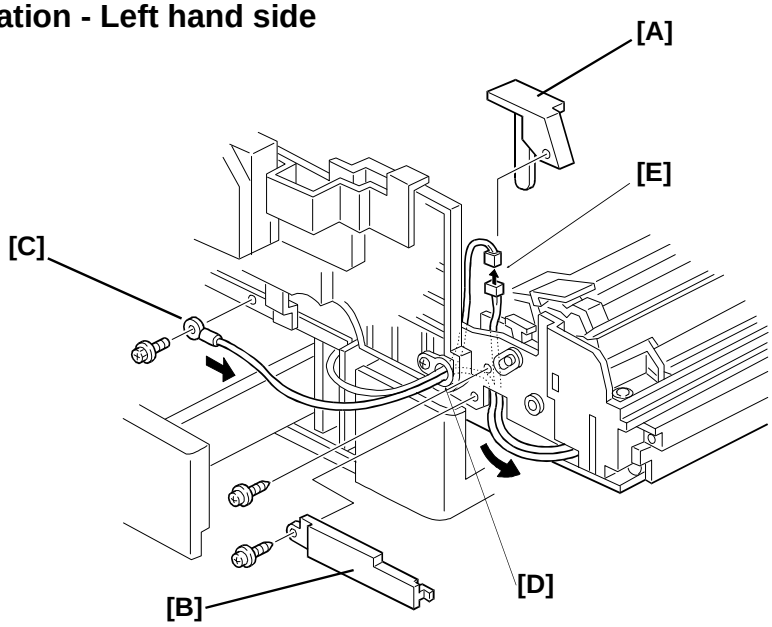
Preparation - Right hand side



H521R625.wmf

First, open the fusing exit cover [D], then remove the sensor assembly [A], bracket [B], and gear [C].
A: Feed-out Sensor/Exit Cover Switch (2 tapping screws, 2 connectors)
B: Bracket (1 screw), C: Gear

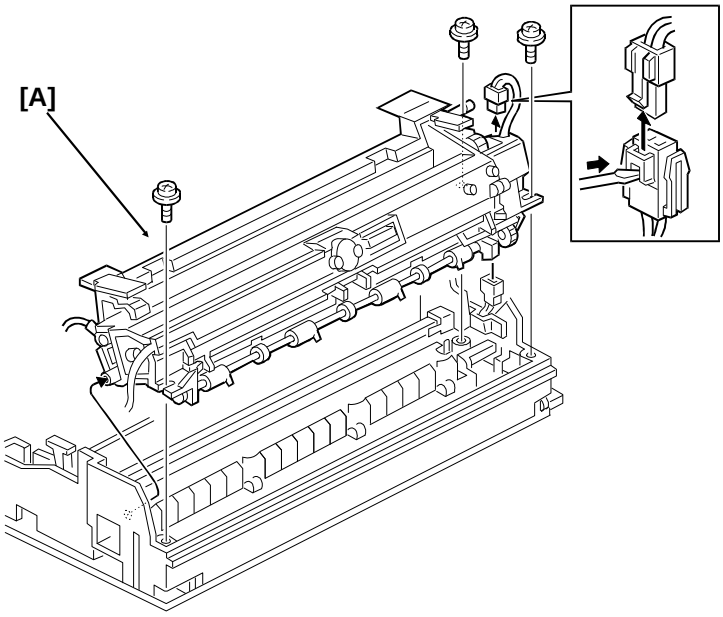
Preparation - Left hand side



H521R034.wmf

First, remove the ground wire [A], fusing unit fulcrum [B], then cover [C].
Note: Put back the bracket [D] after removing the ground wire [A].
A: Harness Cover A (1 tapping screw)
B: Harness Cover B (1 tapping screw)
C: Ground Wire (1 screw)
D: Pull out the Fusing Unit Fulcrum (1 tapping screw)
E: Diaconnect the Thermistor Harness

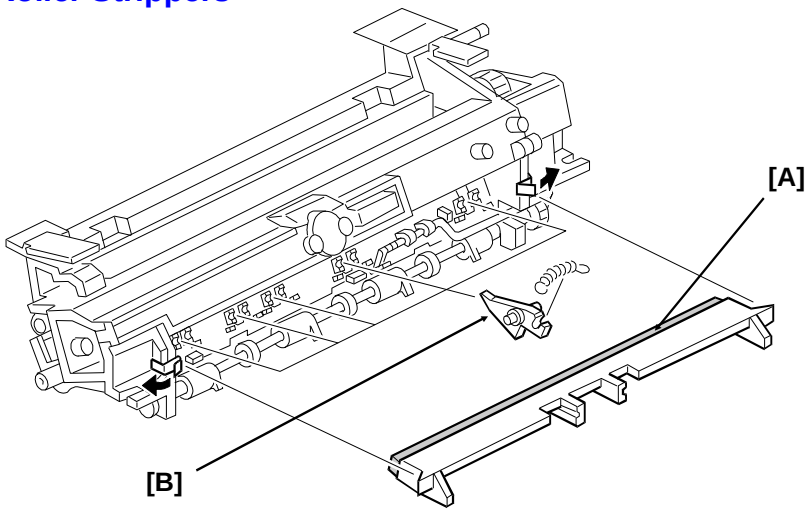
Fusing Unit Removal



H521R035.wmf

A: Fusing Unit (3 screws, 2 connectors)

5.5.3. Hot Roller Strippers

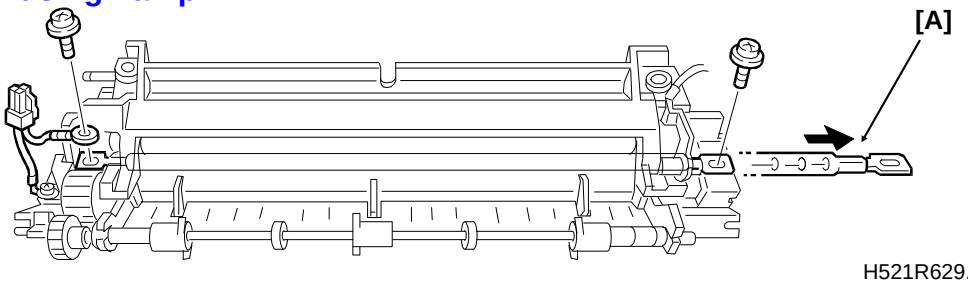


H521R037.wmf

Remove the cleaning felt if it is still in the unit, then remove the strippers.
A: Cleaning Felt
B: Hot Roller Strippers (1 spring each)

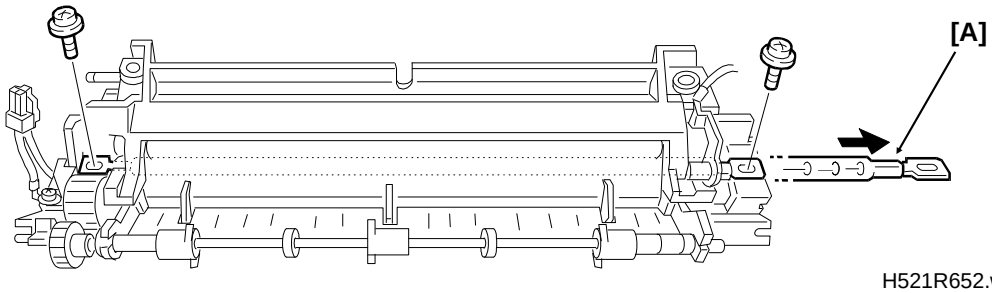
> **⚠CAUTION**
> **Be careful not to lose the springs.**

5.5.4. Fusing Lamp



H521R629.wmf

115 V Models **A: Fusing Lamp (2 screws)**

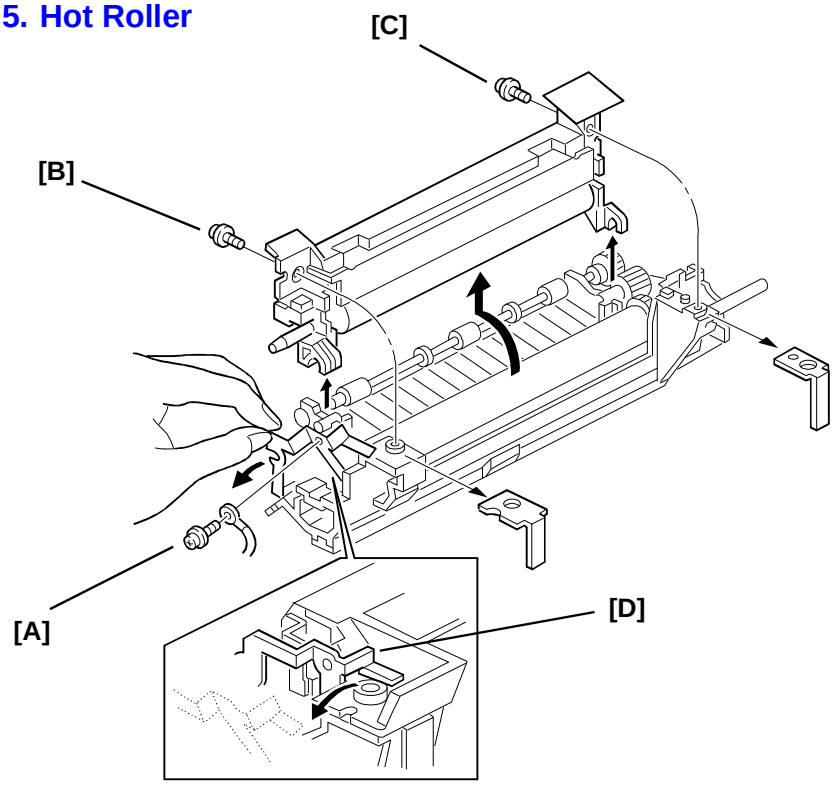


H521R652.wmf

220 V Models **A: Fusing Lamp (2 screws)**

> **⚠CAUTION**
> **Be careful not to touch the glass surface.**

5.5.5. Hot Roller

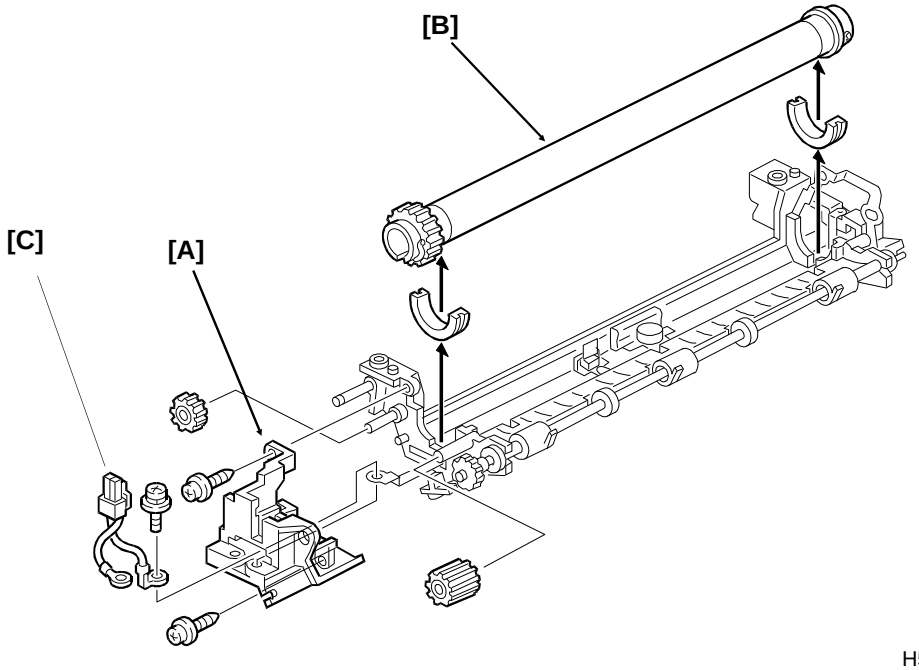


H521R630.wmf

First, remove the tapping screw [A], then remove the tapping screws [B] and [C]. The fusing upper and lower units come apart after the ground plate [D] has been released from the shaft.

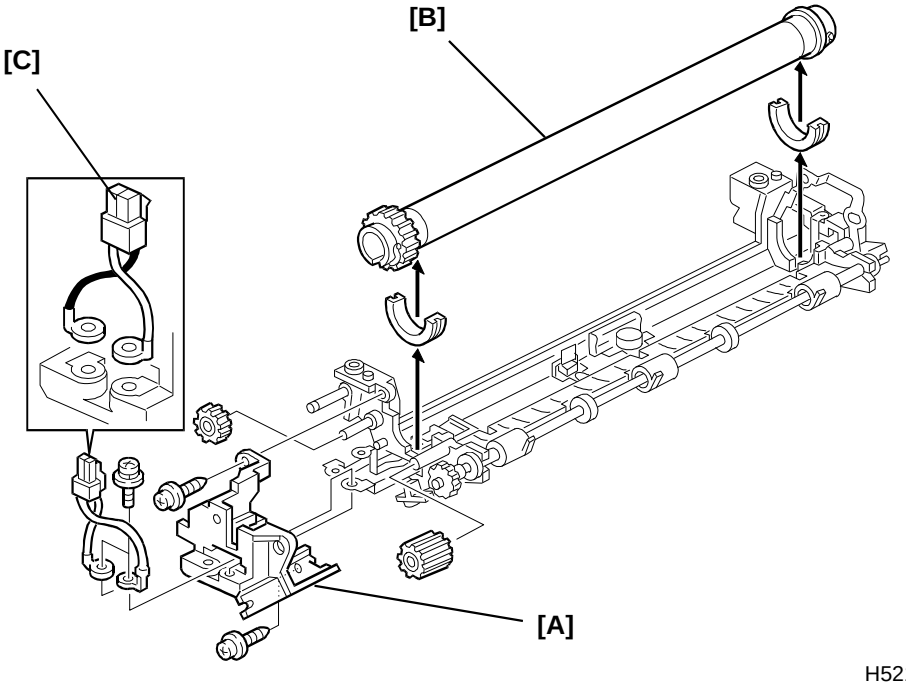
⚠CAUTION
Do not bend the ground plate too much.

Then, remove the bracket [A] then the roller [B].



H521R631.wmf

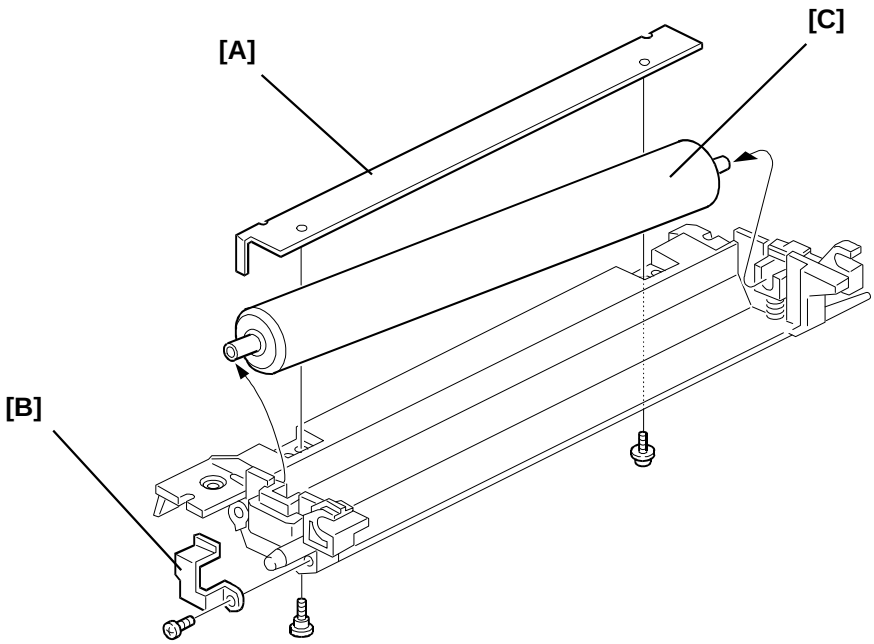
115 V Models
A: Bracket (3 screws, 2 of which are tapping screws)
B: Hot Roller C: Fusing Lamp Connector (1 screw)



H521R653.wmf

220 V Models
A: Bracket (3 screws, 2 of which are tapping screws)
B: Hot Roller C: Fusing Lamp Connector (2 screws)

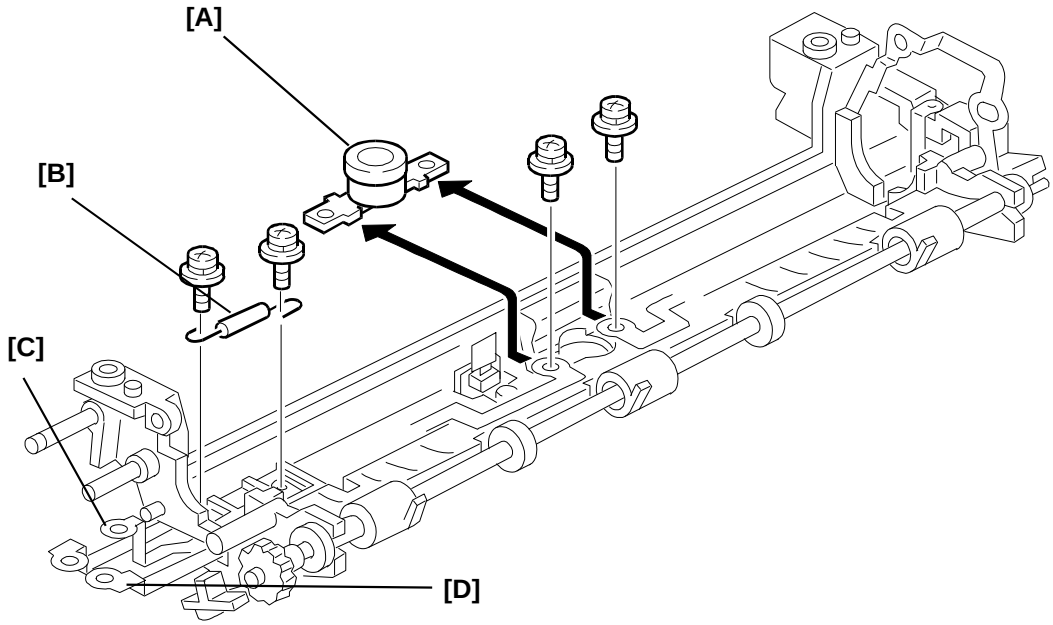
5.5.6. Pressure Roller



H521R632.wmf

A: Bracket (2 screws, 1 of which is a stepped screw)
B: Bracket (1 tapping screw)
C: Pressure Roller

5.5.7. Thermostat and Thermofuse

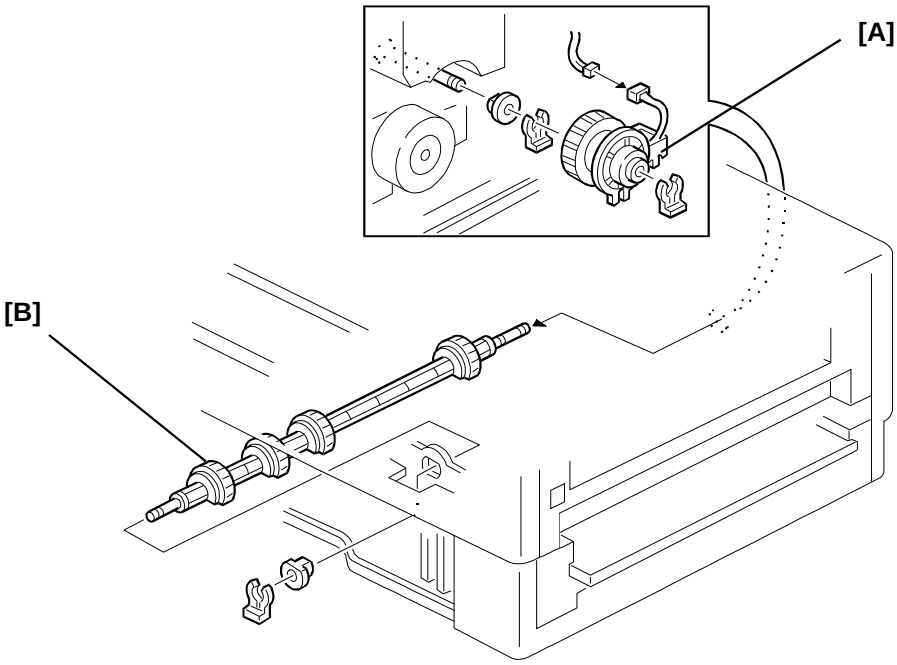


H521R654.wmf

A: Thermostat (2 screws)
B: Thermofuse (2 screws) - 220V models only
C, D: Terminal Plates for the Thermofuse - 220V models only

5.6. PAPER FEED

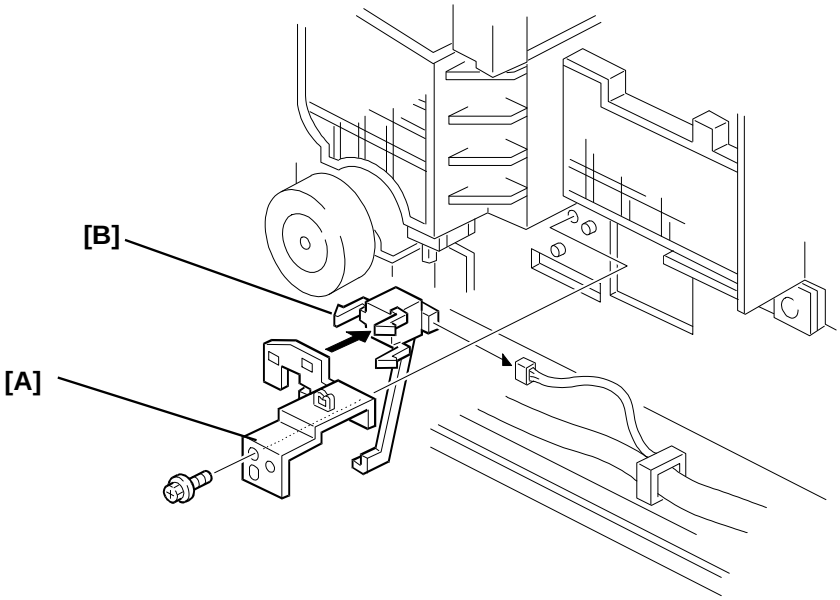
5.6.1. Paper Feed Roller and Clutch



H521R027.wmf

A: Paper Feed Clutch (1 clip, 1 connector)
B: Paper Feed Roller (1 clip and 1 bushing at each end)

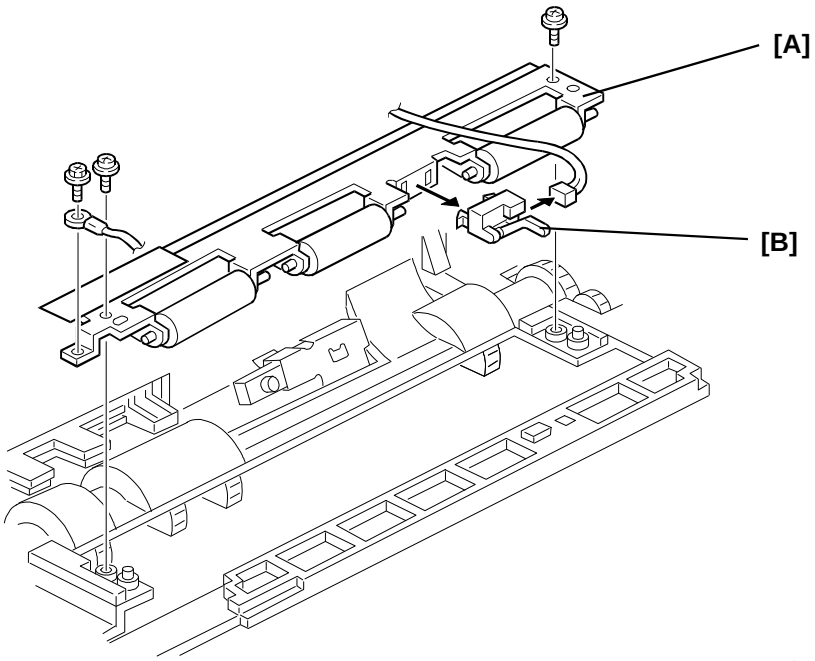
5.6.2. Paper End Sensor



H521R030.wmf

First, remove the bracket [A], then remove the sensor [B].
A: Bracket (1 screw), B: Paper End Sensor (3 hooks)

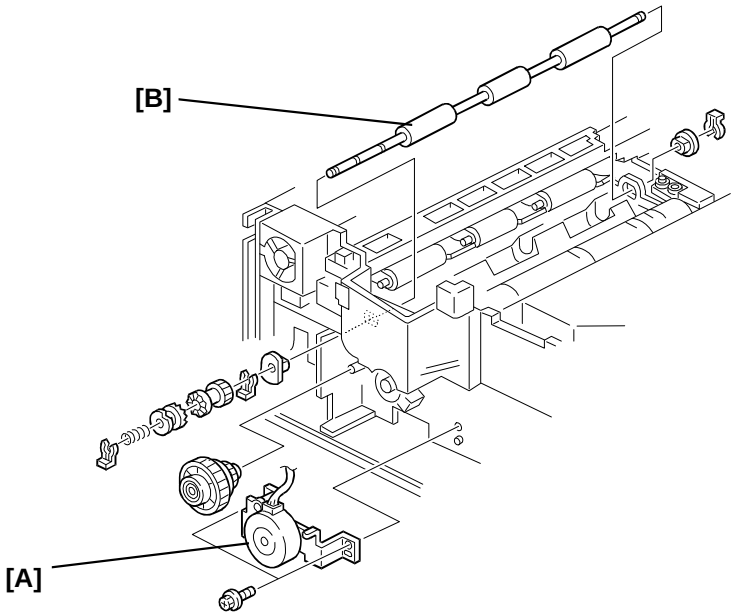
5.6.3. Registration Sensor and Pressure Rollers



H521R029.wmf

First, remove the CTM, master drum, and development unit.
A: Pressure Rollers with Bracket (3 screws, 2 of which are tapping screws)
B: Registration Sensor (2 hooks, 1 connector)

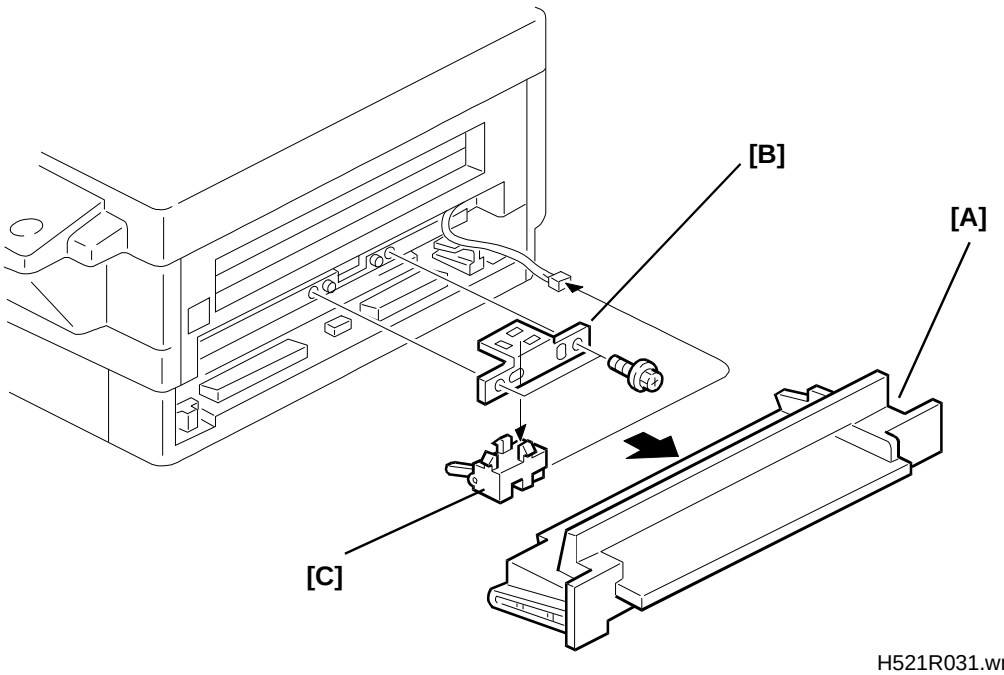
5.6.4. Paper Feed Motor, Gears and Registration Roller



H521R032.wmf

First, remove the registration pressure rollers.
A: Paper Feed Motor (2 screws)
B: Registration Roller (2 clips, 1 spring, 2 gears, 2 bushings)

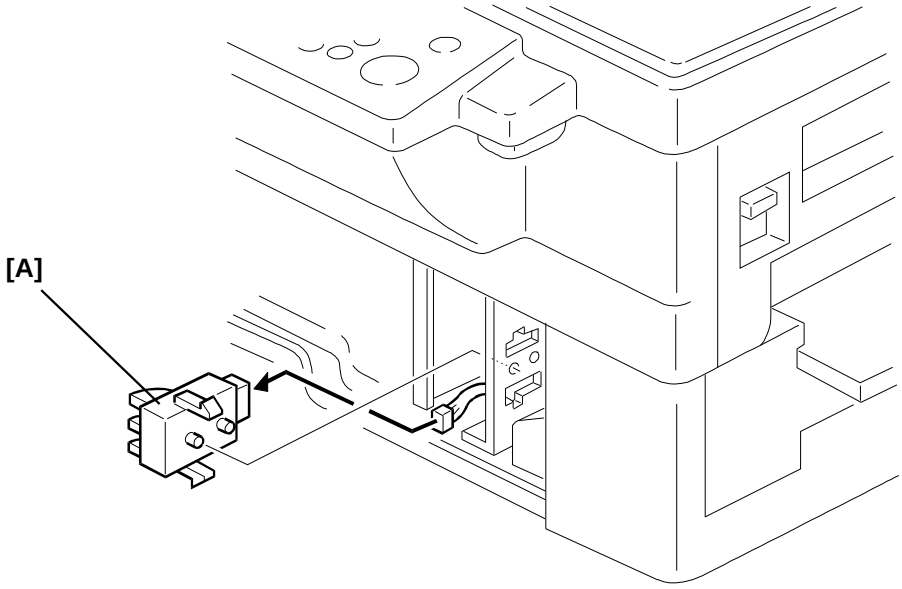
5.6.5. Bypass Feed Sensor



H521R031.wmf

The optional 100 sheet cassette interface [D] should be put back as shown in the diagram (the triangle mark has to be at the left hand side of the connector.
A: Bypass Feed Table
B: Bracket (2 screws)
C: Bypass Feed Sensor (3 hooks)

5.6.6. Paper Size Sensor

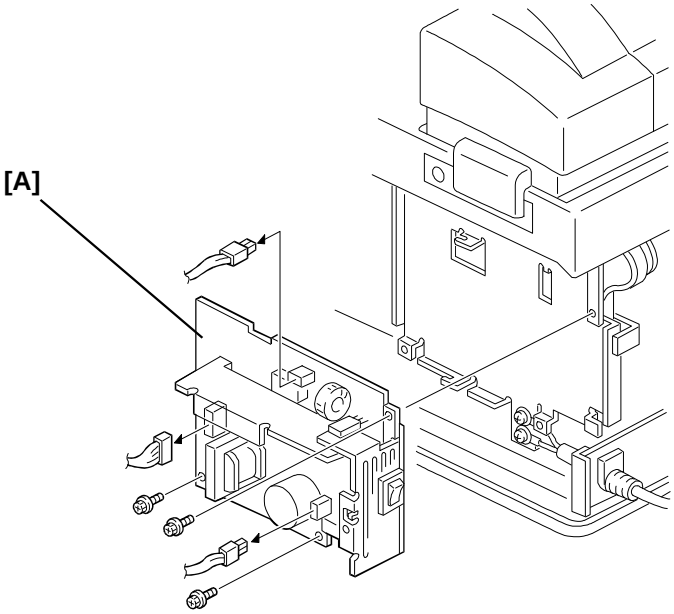


H521R028.wmf

A: Paper Size Sensor (2 hoooks)

5.7. PCBs

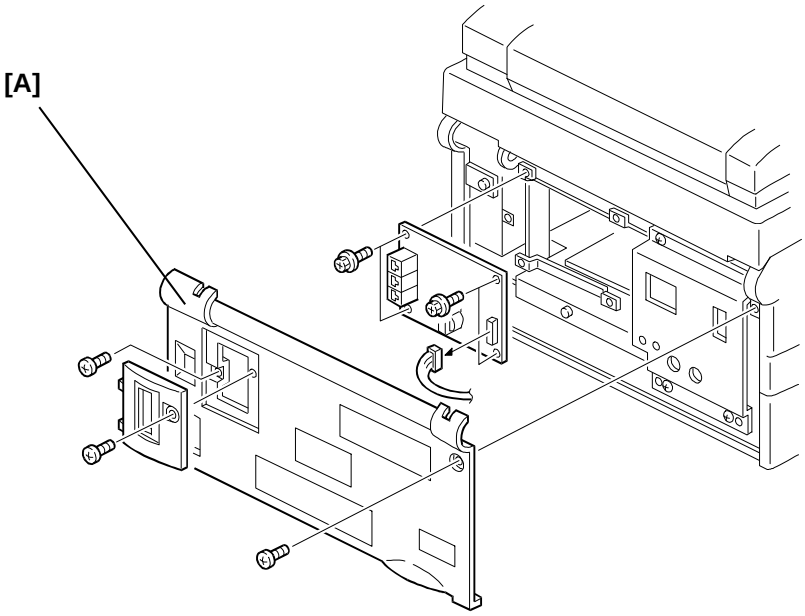
5.7.1. PSU



H521R047.wmf

A: PSU (3 screws, 2 hooks, 3 connectors)

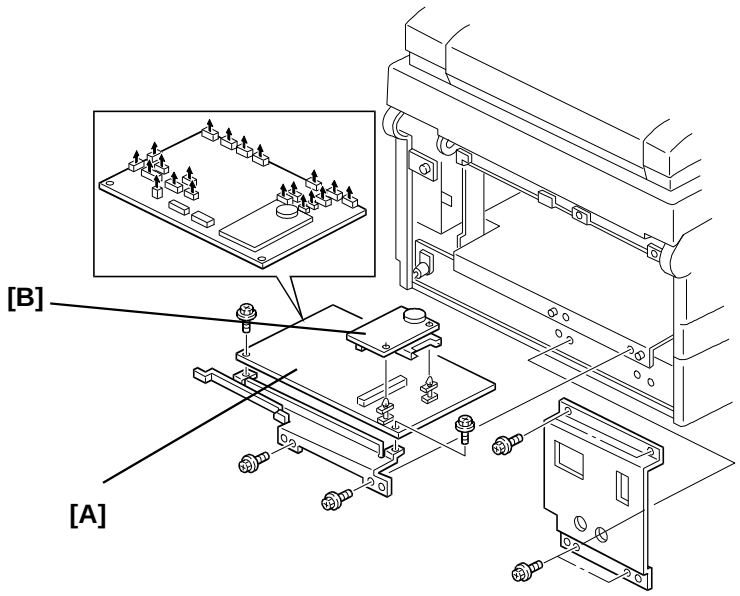
5.7.2. NCU



H521R044.wmf

A: NCU (4 screws, 1 connector)

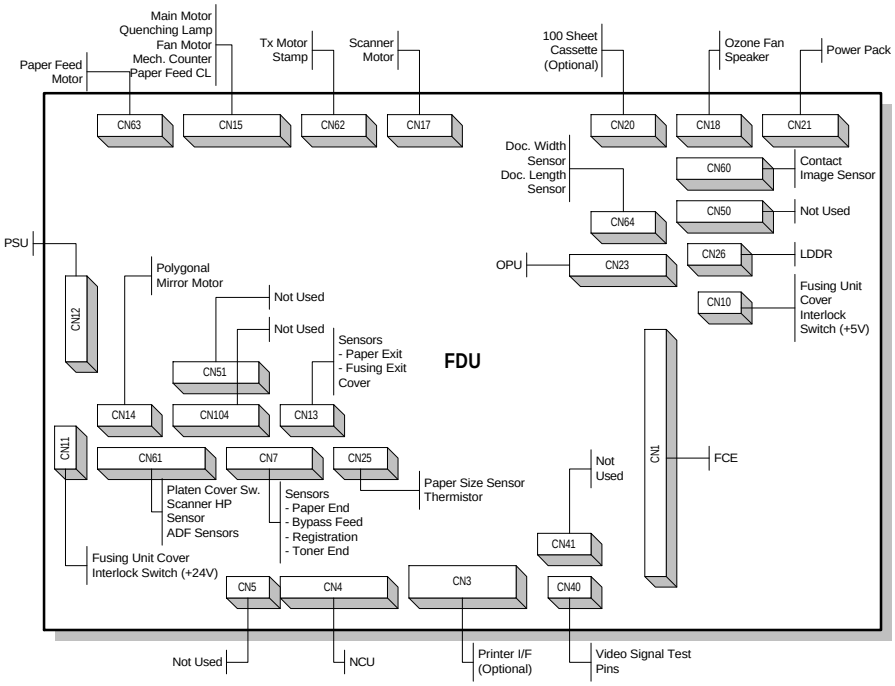
5.7.3. FDU and FCE



H521R045.wmf

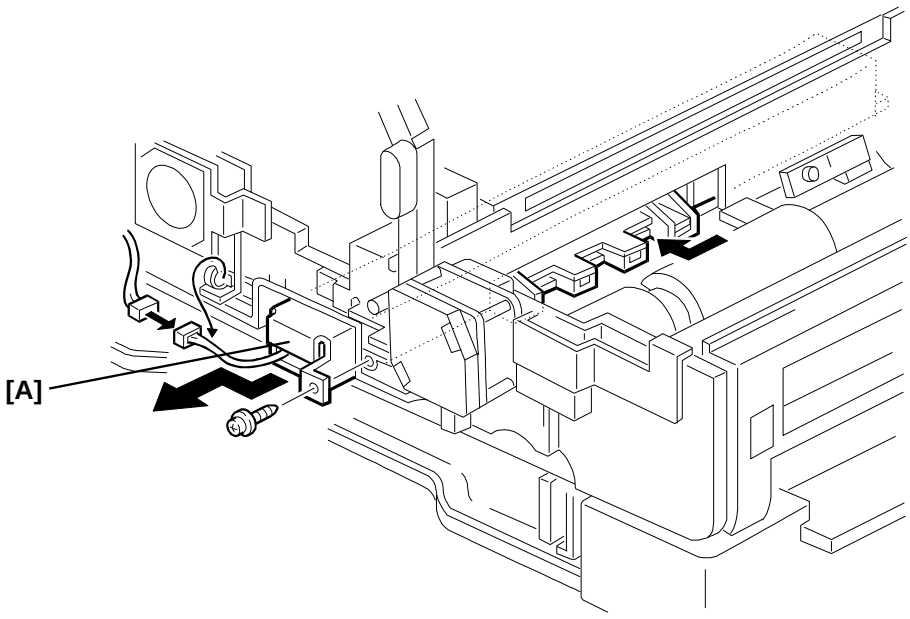
Note: The NCU should be removed first.
A: FDU (2 screws)
B: FCE (2 screws)
After installing the new FCE, transfer the RAM data from the old FCE using service function 12 (refer to section 4.1.22).

Harness Connections from the FDU



H521R545.wmf

5.7.4. Power Pack

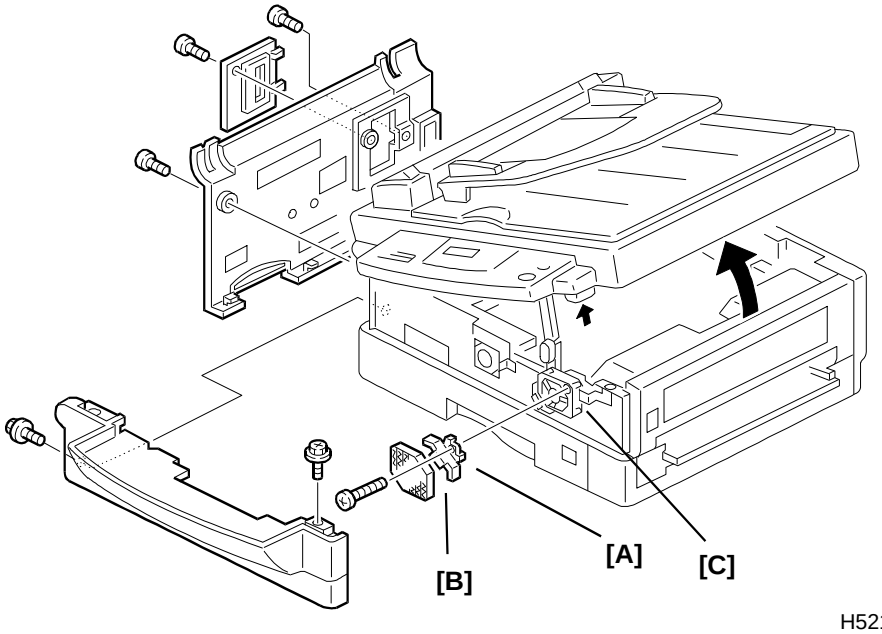


H521R026.wmf

A: Power Pack (1 tapping screw, 1 connector)

5.8. OTHERS

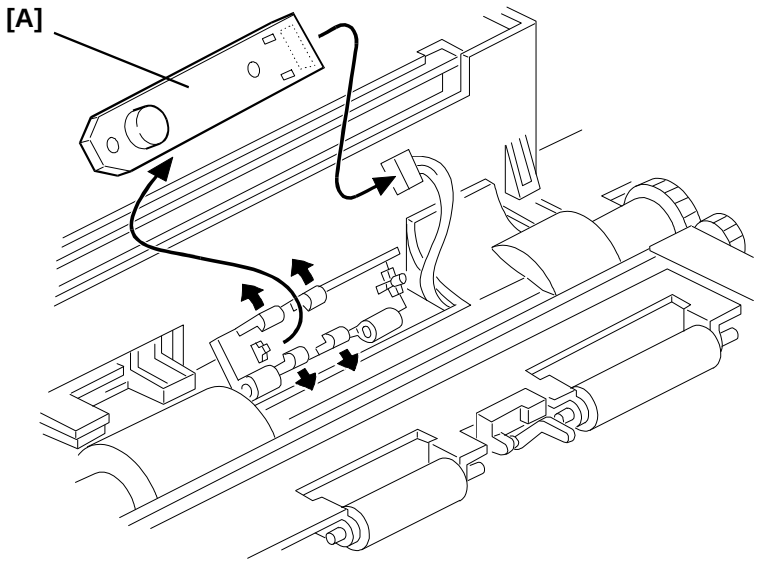
5.8.1. Ozone Filter and Fan Motor



H521R525.wmf

Remove the bracket [A], then the ozone filter [B] and the fan motor [C] can be removed.

5.8.2. Toner End Sensor

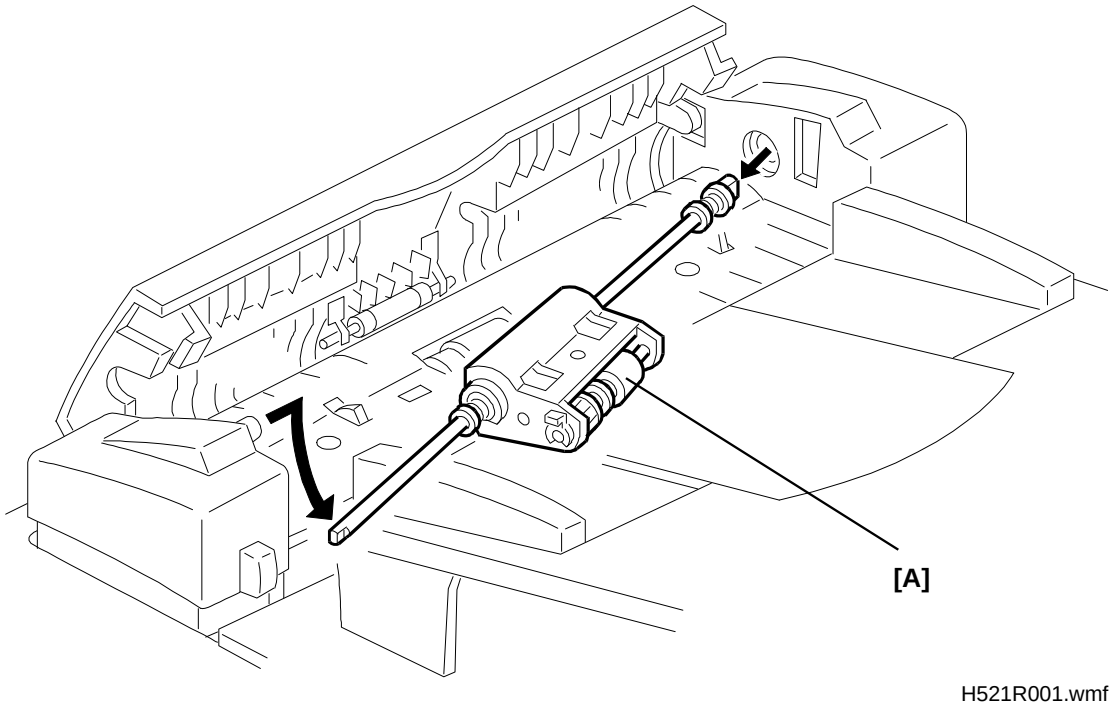


H521R024.wmf

A: Toner End Sensor (1 connector)

5.9. ADF

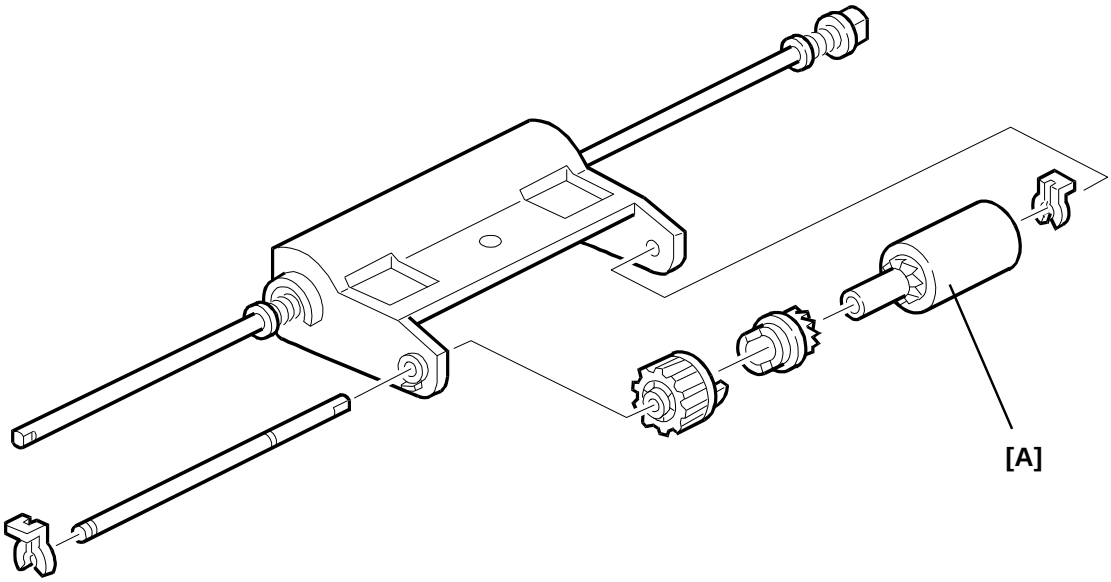
5.9.1. ADF Roller Asssembly and Covers



H521R001.wmf

A: ADF Roller Assembly

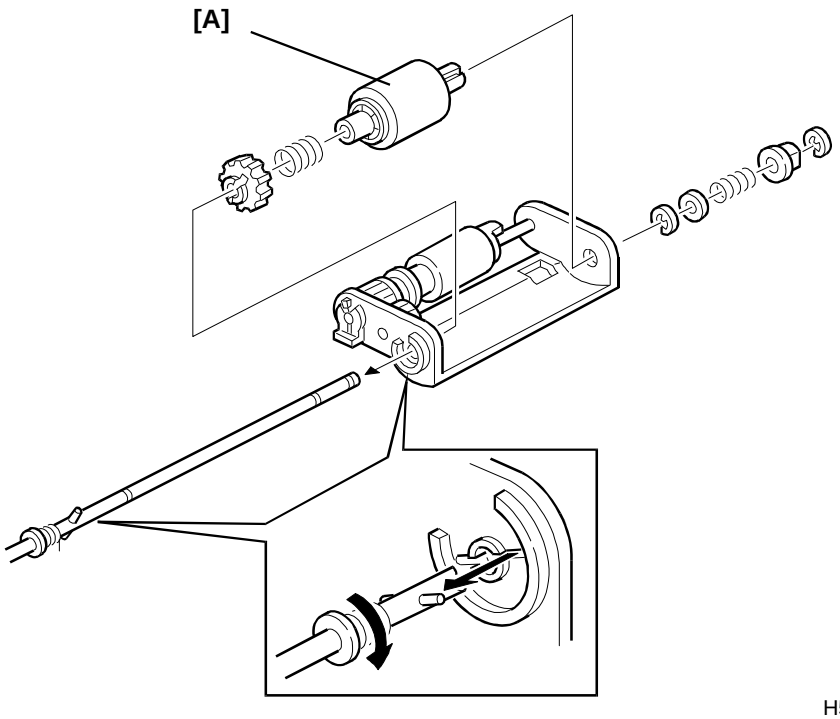
5.9.2. Pick-up Roller



H521R002.wmf

A: Pick-up Roller (2 clips, 2 gears)

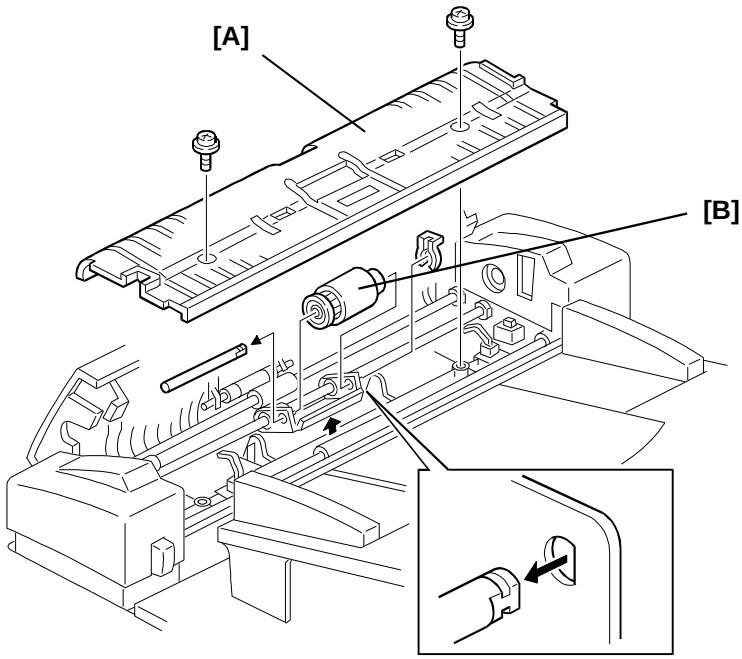
5.9.3. Feed Roller



H521R003.wmf

A: Feed Roller (1 clip, 1 gear, 2 springs, 2 E-rings, 1 washer)

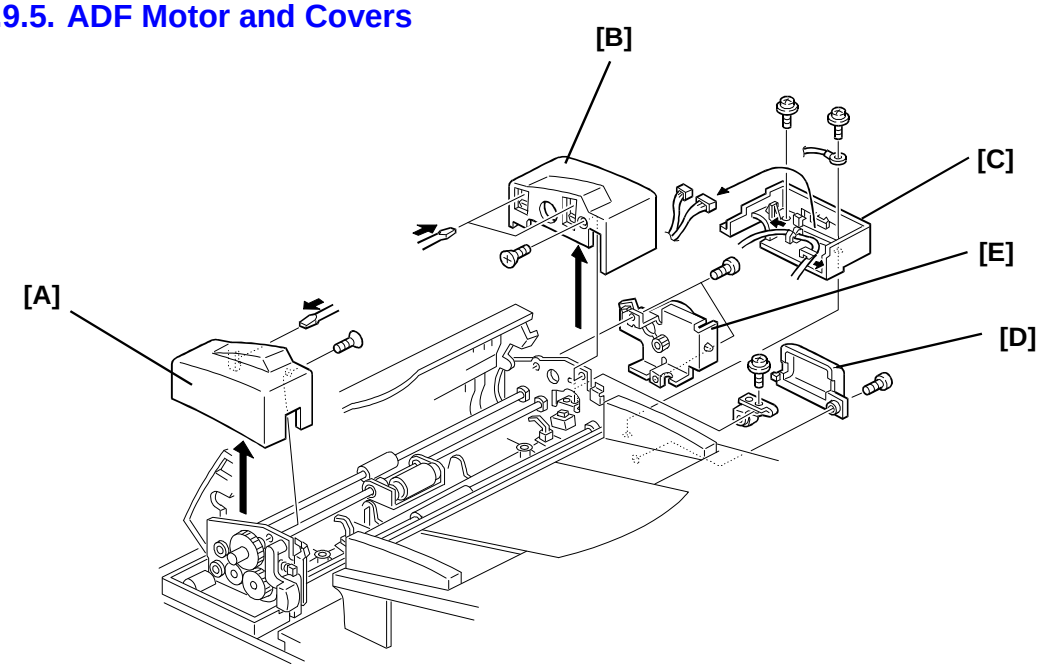
5.9.4. Separation Roller



H521R004.wmf

A: Upper Guide Plate (2 tapping screws), B: Separation Roller (1 clip)

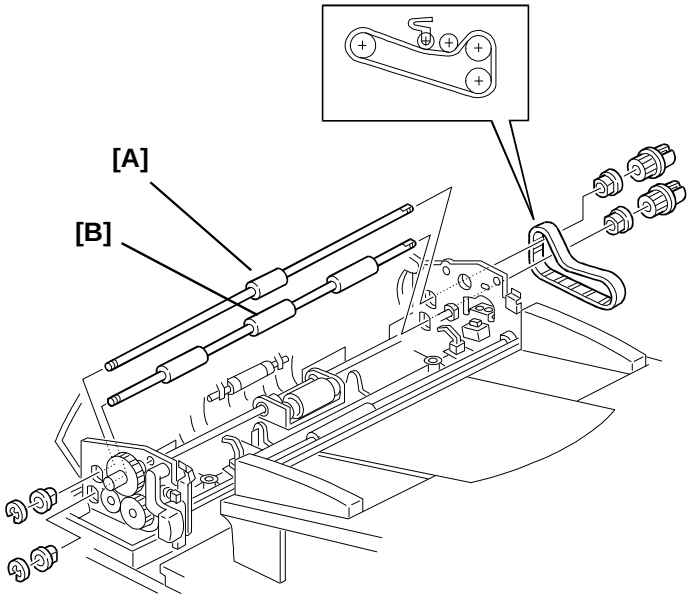
5.9.5. ADF Motor and Covers



H521R005.wmf

A: ADF Upper Front Cover (1 screw, 1 hook)
B: ADF Upper Rear Cover (1 screw, 2 hooks)
C: ADF Lower Rear Cover (2 screws)
D: Connector Cover (1 screw)
E: ADF Motor (2 screws)

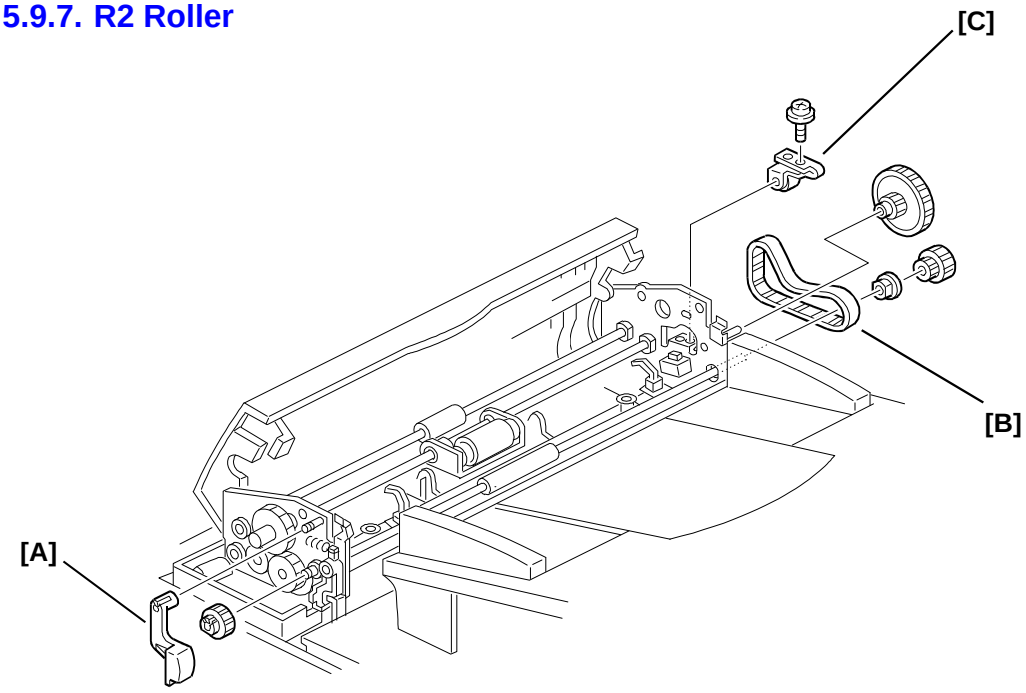
5.9.6. R0 and R1 Rollers



H521R006.wmf

A: R0 Roller (1 E-ring, 1 gear, 2 bushings)
B: R1 Roller (1 E-ring, 1 gear, 2 bushings)

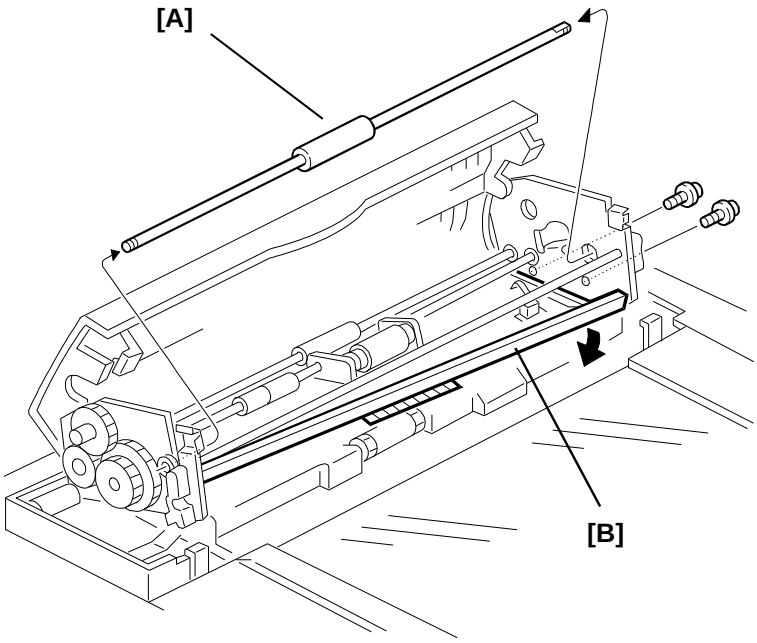
5.9.7. R2 Roller



H521R007.wmf

A: ADF Release Lever
B: Timing Belt
C: Tensioning Roller Ass'y (1 screw)

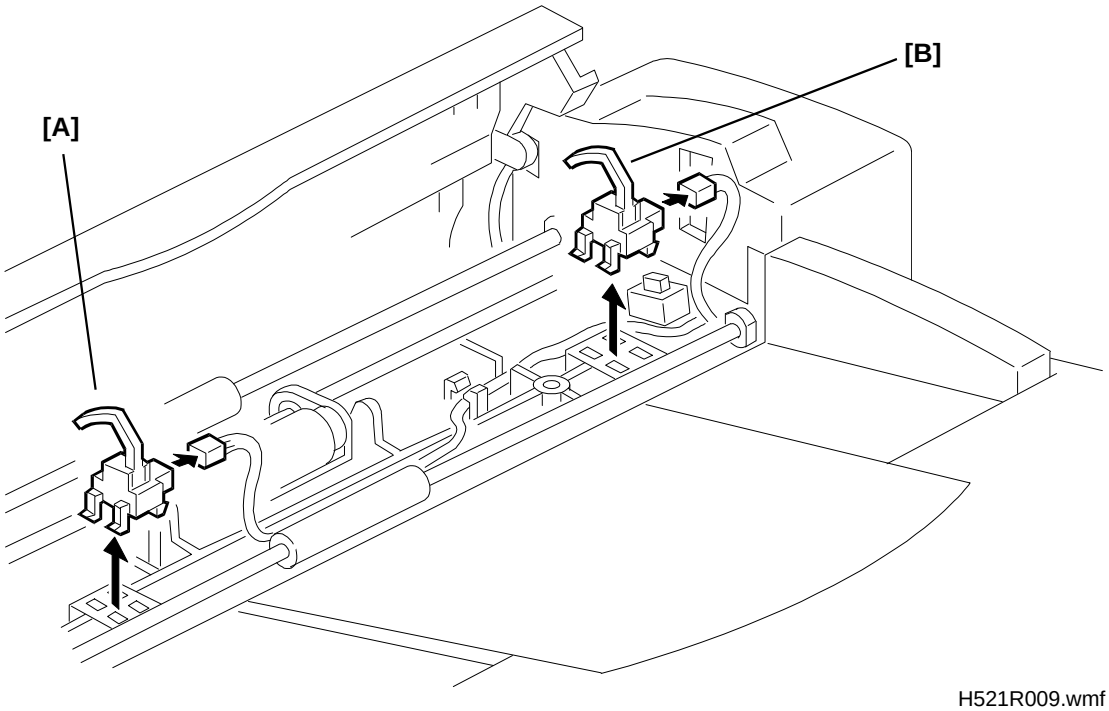
Continued on the next page



H521R008.wmf

Remove the R2 roller [A] while lowering the guide plate [B].

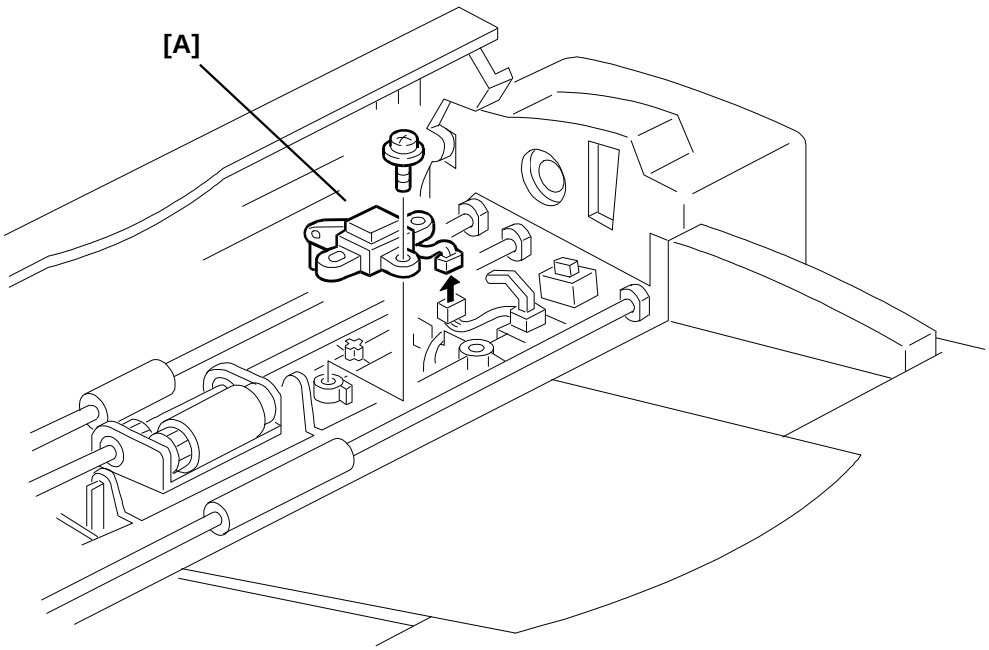
5.9.8. Document Sensor and Width Sensor



H521R009.wmf

A: Document Sensor
B: B4 Width Sensor

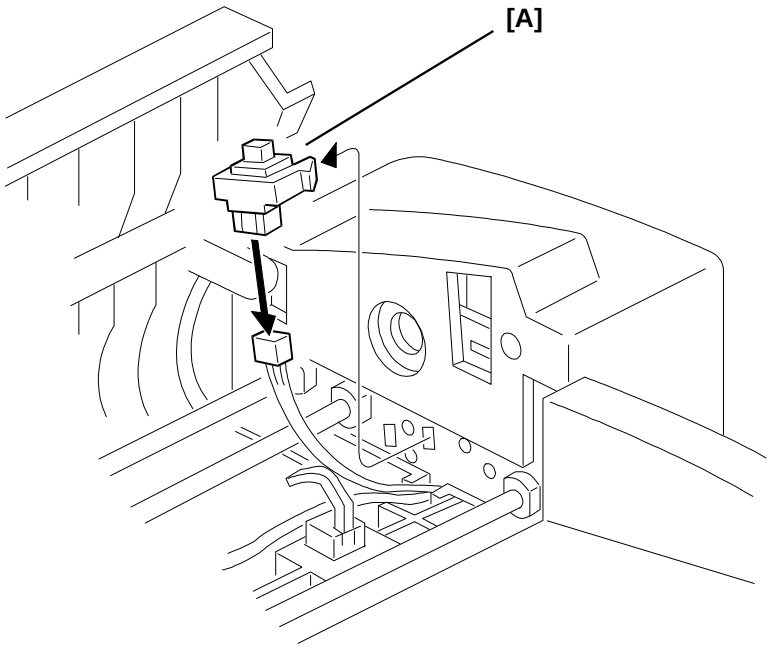
5.9.9. Scan Line Sensor



H521R010.wmf

A: Scan Line Sensor (1 screw)

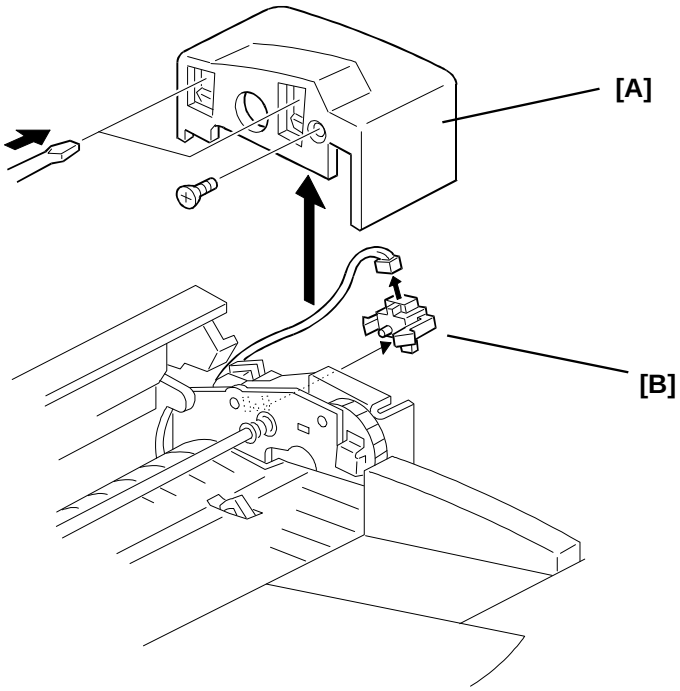
5.9.10. Cover Sensors



H521R011.wmf

A: ADF Cover Switch

Continued on the next page

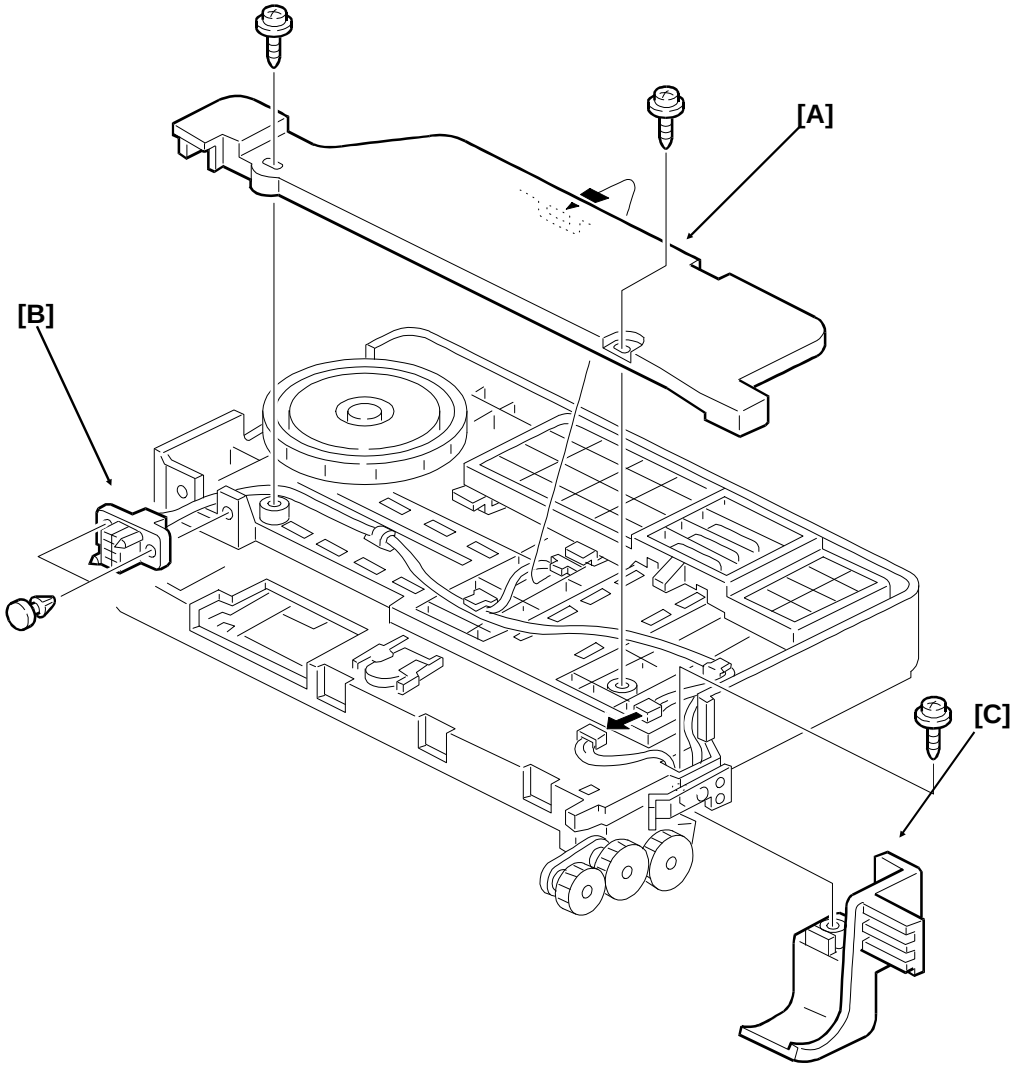


H521R012.wmf

A: Upper Rear Cover (1 screw, 2 hooks)
B: ADF Switch

5.10. 100 SHEET PAPER CASSETTE (OPTIONAL)

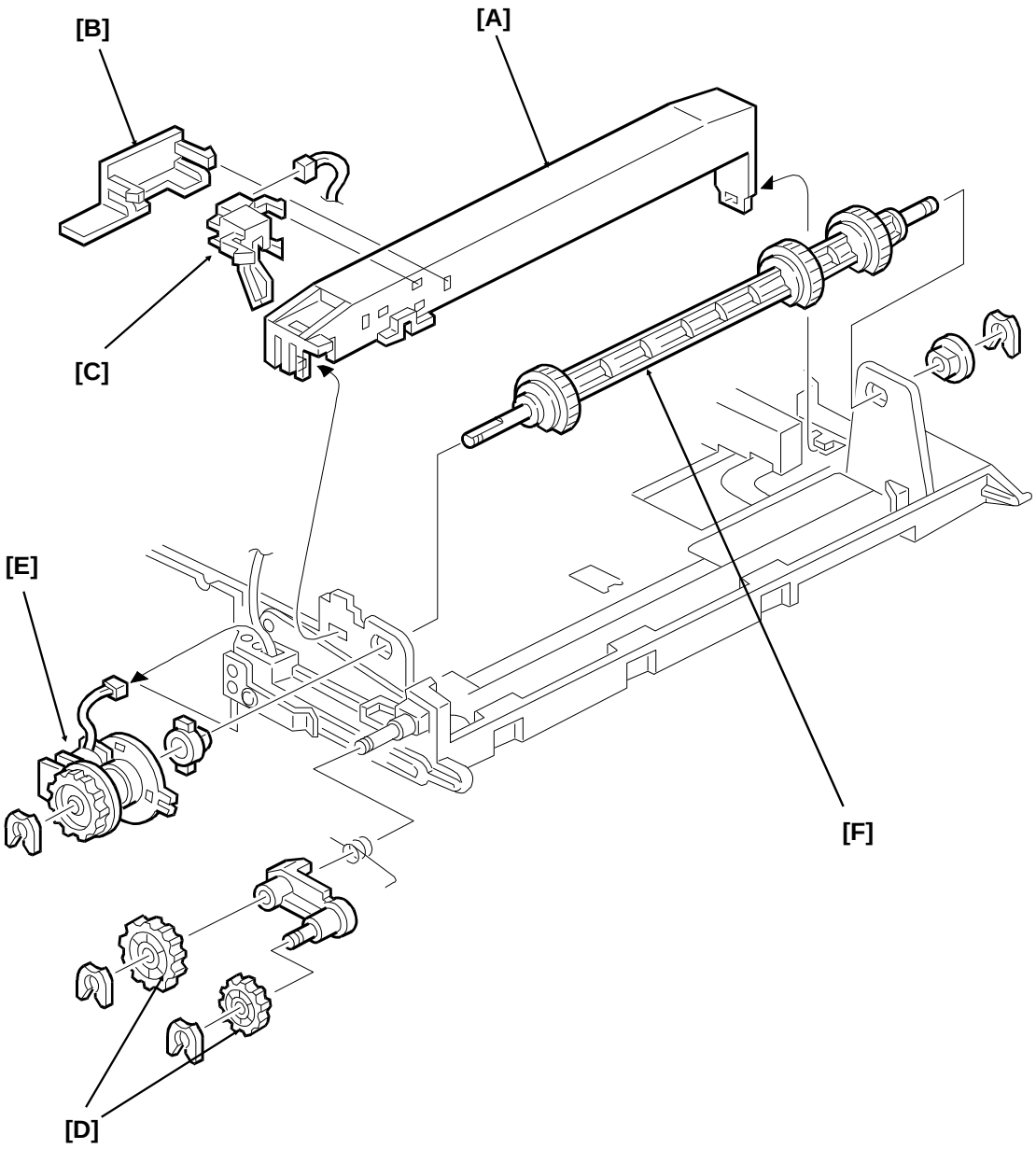
5.10.1. Relay Connector and Gear Cover



H521R642.wmf

Turn the cassette upside down.
A: Harness Cover (2 screws)
B: Interface Connector (2 clips)
C: Gear Cover (1 screw)

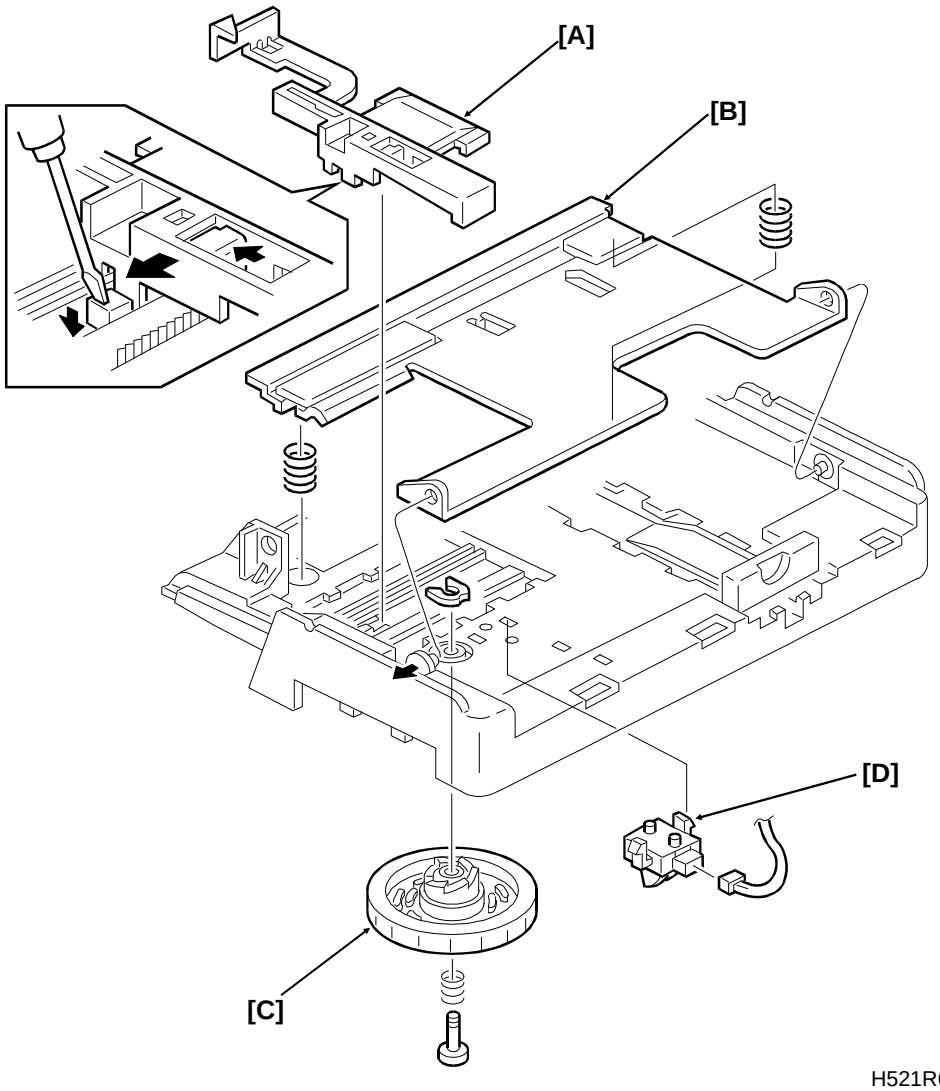
5.10.2. Paper End Sensor and Drive Components



H521R643.wmf

Paper End Sensor
First, remove the stay [A] and the cover [B], then remove the sensor [C].
Paper Feed Clutch and Rollers
First, remove the gears [D], then remove the clutch [E] and roller [F].
A: Sensor Stay (1 hook)
B: Sensor Cover (2 hooks)
C: Paper End Sensor (3 hooks)
D: Idle Gears (1 clip each)
E: Paper Feed Clutch (1 clip)
F: Feed Roller (1 clip, 2 bushings)

5.10.3. Paper Size Sensor



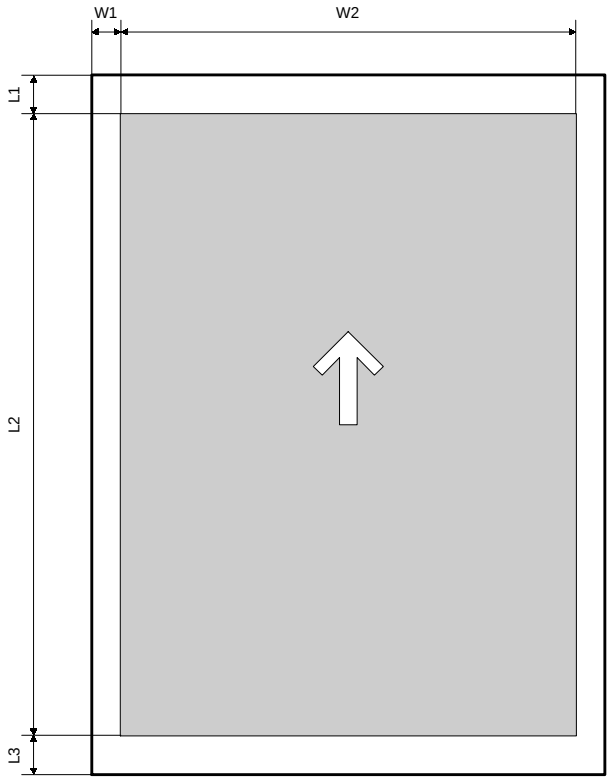
H521R644.wmf

A: Paper Guide
B: Bottom Plate (2 springs)
C: Paper Size Indicator (1 clip, 1 spring)
D: Paper Size Sensor (2 hooks)

5.11. IMAGE ADJUSTMENT

5.11.1. Overview

This section explains how to adjust various scanning and printing parameters. Among these are the margin parameters shown in the diagram below, which are named in accordance with the table below the diagram.



H521R650.wmf

Parameters	Description	Adjustable by		
		Fax - Tx	Fax - Rx	Copying
W1	Left margin	Not adjustable	Printer	Printer
W2	Print/Scan width	Not adjustable	Not adjustable	Not adjustable
L1	Top margin	Scanner	Printer	Scanner/Printer
L2	Print/Scan length	Not adjustable	Not adjustable	Not adjustable
L3	Bottom margin	Scanner	Not adjustable	Scanner/Printer (Bypass only)

⚠CAUTION

The factory settings may not be the same as the “Initial settings” described in the following procedures. The RAM reset level 0 will reset all the scan and print margin parameters to the “Initial settings.”

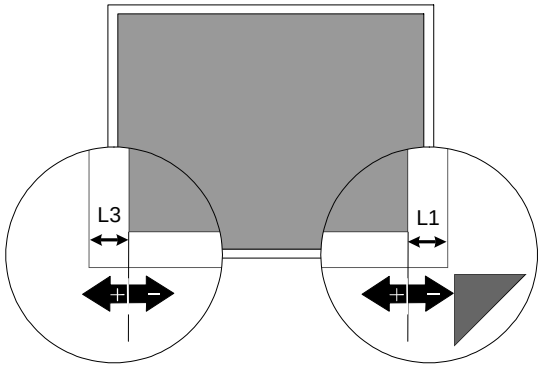
5.11.2. Scanner Parameters

1. Contrast

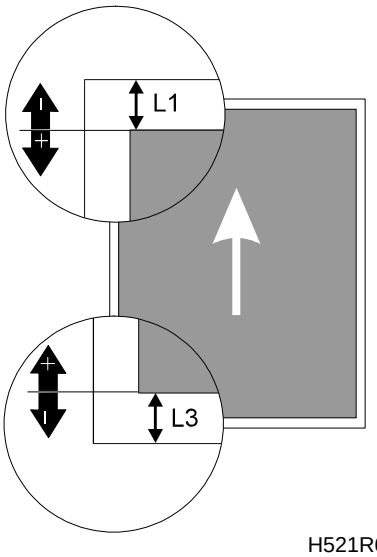
	Text Mode		Halftone Mode	
	Bit Switch	**Initial Setting**	**Bit Switch**	**Initial Setting**
Normal	Scanner 02	08(H)	Scanner 05	07(H)
Lighten	Scanner 03	0B(H)	Scanner 06	08(H)
Darken	Scanner 04	06(H)	Scanner 07	06(H)

2. Margins

Book Scanner

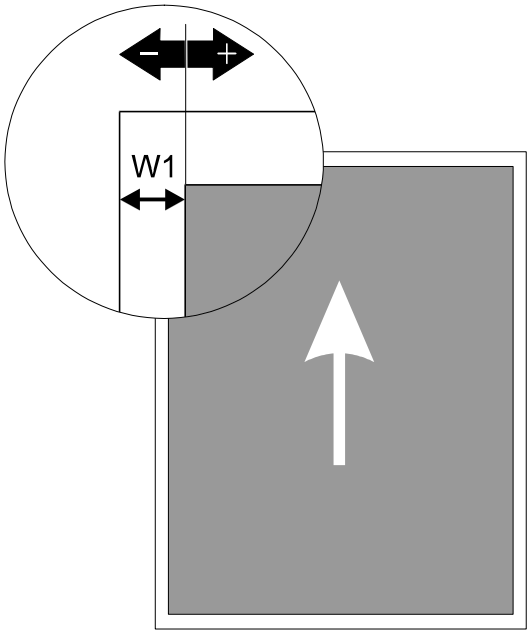
Parameter	Formula	RAM Address	Unit	Initial Setting
W1	Not adjustable			
W2	Not adjustable			
L1	 H521R551.wmf This parameter changes the number of tx motor steps after the black mark for fine positioning was detected. To increase the margin by x mm: **New setting = Current setting + 15.4x** To decrease the margin by x mm: **New setting = Current setting - 15.4x**	8002A9(H) (low) 8002AA(H) (high)	$\frac{1}{15.4}$ *mm*	41(H) [65(D)]
L2	Not adjustable (Original length - L1 - L3)			
L3	To increase the margin by x mm: **New setting = Current setting - 15.4x** To decrease the margin by x mm: **New setting = Current setting + 15.4x**	8002AB(H)	$\frac{1}{15.4}$ *mm*	7F(H) [127(D)]

ADF

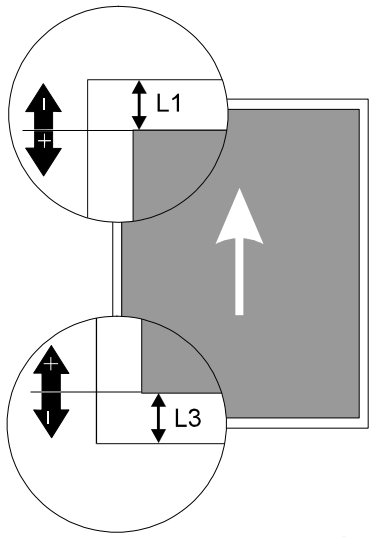
Parameter	Formula	RAM Address	Unit	Initial Setting
W1, W2	Not adjustable			
L1	 H521R651.wmf This parameter changes the number of tx motor steps after the scan line sensor is activated. To increase the margin by x mm: **New setting = Current setting + 7.7x** To decrease the margin by x mm: **New setting = Current setting - 7.7x** Initial setting of L1: 2 mm	8002A5(H) (low) 8002A6(H) (high)	$\frac{1}{7.7}$ *mm*	81(H) [129(D)]
L2	Not adjustable (Original length - L1 - L3)			
L3	This parameter changes the number of tx motor steps after the scan line sensor is deactivated. To increase the margin by x mm: **New setting = Current setting - 7.7x** To decrease the margin by x mm: **New setting = Current setting + 7.7x** Initial setting of L3: 2 mm	8002A7(H) (low) 8002A8(H) (high)	$\frac{1}{7.7}$ *mm*	4D(H) [77(D)]

5.11.3. Printer Parameters

1. Margin (Main Scan Direction)

Parameter	Formula	RAM Address	Unit	Initial Setting
W1	H521R648.wmf  To increase the margin by x mm: **New setting = Current setting + x/0.5** To decrease the margin by x mm: **New setting = Current setting - x/0.5** Initial setting of W1: 2 mm	Standard cassette: 800357(H) 100 sheet cassette: 80035C(H) Bypass feed: 80035D(H)	0.5 mm	05(H) Min: 0 Max: 64(H)
W2	Not adjustable			

2. Margin (Sub Scan Direction)

Parameter	Formula	RAM Address	Unit	Initial Setting
L1	 H521R651.wmf To increase the margin by x mm: **New setting = Current setting + x/0.66** To decrease the margin by x mm: **New setting = Current setting - x/0.66** Initial setting of L1: 2 mm	Standard cassette: 80034D(H) 100 sheet cassette: 800352(H) Bypass feeder: 800353(H)	0.66 mm	03(H) 07(H) 00(H) Max: 30(H) 19.8 mm
L2	Not adjustable			
L3	This is only adjustable in bypass feed mode. To increase the margin by x mm: **New setting = Current setting - x/0.338** To decrease the margin by x mm: **New setting = Current setting + x/0.338** **Example:** To increase the margin by 5 mm. 5/0.338 ≈ 14.8 ≈ 15(D) = F(H) **New setting** = 3B - F = 2C(H)	800363(H)	0.338 mm	3B(H)

5.11.4. Scanner Video Processing Parameters

1. Contrast

Mode	Address	Threshold Value (H)	Range
Copy Mode, without Halftone, Auto Image Density on			
Darken	8003FDH	08	00 - 0F
Normal	8003FEH	0C	
Lighten	8003FFH	0F	
Copy Mode, without Halftone, Auto Image Density off			
Darken	800400H	08	00 - 1F (Note 1)
Normal	800401H	0F	
Lighten	800402H	16	
Copy Mode, with Halftone, Auto Image Density off			
Darken	800403H	05	00 - 0F
Normal	800404H	09	
Lighten	800405H	0D	
Fax Mode, without Halftone, Auto Image Density on			
Darken	800406H	06	00 - 0F
Normal	800407H	0A	
Lighten	800408H	0E	
Fax Mode, without Halftone, Auto Image Density off			
Darken	800409H	0D	00 - 1F (Note 1)
Normal	80040AH	0F	
Lighten	80040BH	11	
Fax Mode, with Halftone, Auto Image Density off			
Darken	80040CH	03	00 - 0F
Normal	80040DH	07	
Lighten	80040EH	0B	

Notes:
1. The range of these parameters are different (00 to 1F) from others, because a different video process parameter is changed using these RAMs.
2. A smaller setting leads to a darker image.

2. Image Processing Parameters Adjustment

The tables in the following pages show the following video processing parameter settings for each of scanning mode.
One byte of parameter is assigned for each mode, and they all have the same definitions as follows.

Bit No.	FUNCTION	COMMENTS
0	Edge detection during the halftone process 0: Off 1: On	This bit can be used in halftone mode only. 0: The image becomes lighter, and thin lines become paler. 1: Suitable for most photo originals.
1	Auto image density during the normal image process 0: Off 1: On	Do not change the setting.
2	Edge detection threshold during the halftone process 0: Normal 1: High	0: The image becomes lighter (suitable for enlarged copies). 1: The image becomes darker (suitable for full-size copies).
3	Background detection threshold during the normal image process 0: High 1: Low	0: Suitable for originals that have dark background (e.g. newspaper) 1: Suitable for most originals.
4	Edge enhancement during the halftone process 0: Off 1: On	0: Suitable for photo originals (default setting). 1: Suitable for originals with photo and text. The edges of text become much sharper, but moire might appear in photo areas.
5	MTF algorithm 0: Low 1: High	The “High” setting enhances the thickness of thin lines and dots more than the “Low” setting. Only one of these bits is used for each scanning mode; see the notes at the end of the parameter setting table for details.
6	MTF algorithm 0: Low 1: High	
7	MTF 0: Off 1: On	In ADF mode, the MTF process is disabled. 0: In halftone mode, the image becomes lighter. In normal mode, thin lines may not be reprouced clearly. 1: The thickness of thin lines and dots are enhanced, but small letters might become filled in.

Copy Mode Parameters

Mode				Address	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
W/O HALFTONE	AID ON	BOOK MODE	Full Size	80040FH	1	1	0	0	1	0	1	0
			115%-155% Enlargement	800410H	1	1	0	0	1	0	1	0
			200% Enlargement	800411H	1	1	0	0	1	0	1	0
		ADF MODE	Full Size	800412H	0	1	0	0	0	0	1	0
			115%-155% Enlargement	800413H	0	1	0	0	0	0	1	0
			200% Enlargement	800414H	0	1	0	0	0	0	1	0
	AID OFF	BOOK MODE	Full Size	800415H	1	1	0	0	1	0	0	0
			115%-155% Enlargement	800416H	1	1	0	0	1	0	0	0
			200% Enlargement	800417H	1	1	0	0	1	0	0	0
		ADF MODE	Full Size	800418H	0	1	0	0	0	0	0	0
			115%-155% Enlargement	800419H	0	1	0	0	0	0	0	0
			200% Enlargement	80041AH	0	1	0	0	0	0	0	0
HALFTONE		BOOK MODE	Full Size	80041BH	1	0	0	0	0	1	0	1
			115%-155% Enlargement	80041CH	1	0	0	0	0	0	0	1
			200% Enlargement	80041DH	1	0	0	0	0	0	0	1
		ADF MODE	Full Size	80041EH	1	0	0	0	0	0	0	1
			115%-155% Enlargement	80041FH	1	0	0	0	0	0	0	1
			200% Enlargement	800420H	1	0	0	0	0	0	0	1

Notes

1. Bits in the shaded part of the table must not be changed.
2. Bit 6 is for the “Darken” setting, and bit 5 is for other contrast settings.

Mode			Address	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
W/O HALFTONE	AID ON	Book mode	800421H	1	1	0	0	0	0	1	0
		ADF mode	800422H	0	0	0	0	0	0	1	0
	AID OFF	Book mode	800423H	1	1	0	0	0	0	0	0
		ADF mode	800424H	0	0	0	0	0	0	0	0
HALFTONE		Book mode	800425H	1	0	0	0	0	0	0	1
		ADF mode	800426H	1	0	0	0	0	0	0	1

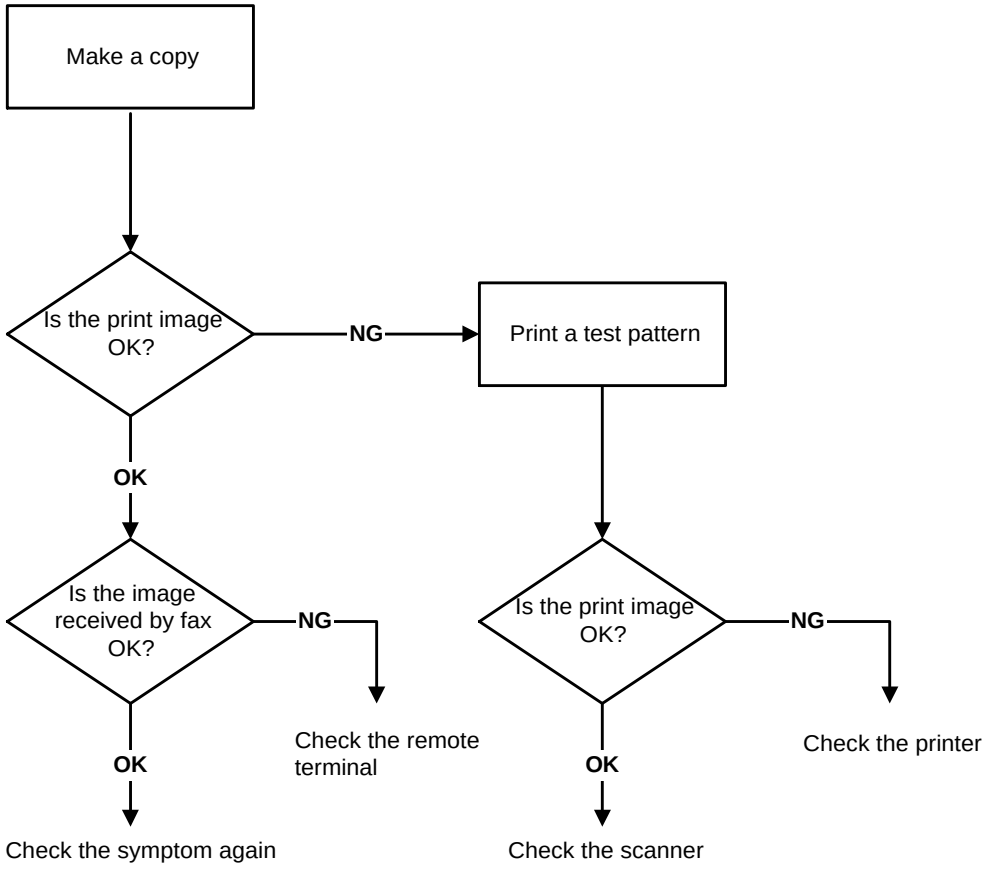
Notes

1. Bits in the shaded part of the table must not be changed.
2. Bit 6 is for “Standard” and “Detail” resolutions, and bit 5 is for “Fine” resolution.

6. TROUBLESHOOTING

6.1. COPY QUALITY TROUBLESHOOTING

If there is a copy quality problem that cannot be solved easily, try using the following troubleshooting procedures, while referring to the point-to-point diagram. The procedures may not be exhaustive, but they may help you to find the problem.



h521t614.wmf

First, distinguish whether the problem is caused by the remote terminal or by your machine. If the problem is caused by your machine, distinguish whether it is due to a scanner problem or a printer problem.

6.1.1. Blank Copies

Possible Cause (Scanner):

- Malfunction in the scanner drive mechanism.
- Obstructions in the scanner drive path.

Action:

1. Do the ADF test (service function 10) and check that the scanner moves correctly. Also, check for any obstrctions in the scanner drive path.
2. If the problem occurs only during ADF copying, check that the scanner moves to the correct ADF scanning position.

Possible Cause (Printer):

- Poor drum sensitivity.
- Laser optic components are out of position.
- The proper bias voltages are not applied to the toner application roller and/or the development roller.
- The proper current is not applied to the transfer roller.

Action:

1. Print a test pattern, and open the cover in the middle of printing.
2. Check if there is toner adhered to the drum surface.
   If there is, do the following. If not, go to step 3.
   - Check if the transfer roller is installed correctly or not.
   - Check if the development unit is installed correctly or not.
   - Check if the resistance between the transfer bias terminal on the development unit and the transfer roller shaft is less than 10 kOhm or not, while pushing the roller shaft down to the roller holder.
   - If the resistance is OK, check the connections behind the power pack and the power pack itself.
3. Check if there is toner on the surface of the development roller.
   If there is, do the following. If not, go to step 4.
   - Check if all the laser optic components are properly positioned.
   - Try replacing the drum.
4. Check if the toner cartridge is empty or not. If it is, do the following. If not, go to step 5.
   - Check or replace the toner end sensor.
5. Do the following.

- Check that the development unit is correctly installed or not.
- Check if the resistance between the development roller bias terminal on the development unit and the development roller shaft, the toner metering plate, and the bias brush are less than 1 kOhm or not.
- Check if the resistance between the toner application roller bias terminal on the development unit and the toner application roller shaft is less than 1 kOhm or not.
- If all the resistances are OK, check the connections behind the power pack and the power pack itself.

6.1.2. Black Copies

Possible Cause (Scanner)

- The contact image sensor is defective.
- The xenon lamp, or the xenon lamp driver is defective.

Action:

1. Check the connection between the FDU (CN60) and the contact image sensor.
2. Do the ADF lamp test (service function 10) and check that the xenon lamp is working properly.
3. Check that the two springs which push up the contact image sensor against the exposure glass are correctly installed.
4. Replace the contact image sensor.

Possible Cause (Printer)

- The charge is not properly applied.

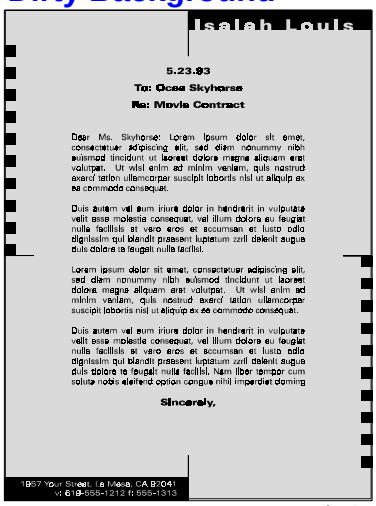
Action:

1. Check if all the charge bias terminals on the development unit and the CTM, and the charge wire are properly connected or not.
   - If they are, go to step 2.
   - If not, fix the connections.

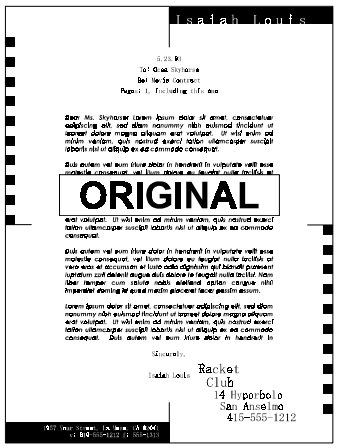
2. Check if the zener diode is not shorted.
   - If the zener diode is shorted, replace the zener diode.
   - If it is not, go to step 3.

3. Check the connections behind the power pack.

6.1.3. Dirty Background



h521t607.wmf



h521t612.wmf

Possible Cause (Scanner)

- Scanner shading correction error or wrong threshold.

Action:

1. Clean the shading plate (for both book and ADF).
2. Adjust the scanner contrast threshold settings.

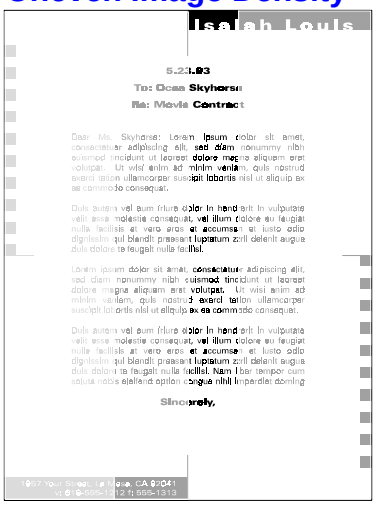
Possible Cause (Printer)

- Poor drum sensitivity.
- The charge is not properly applied.
- The hot roller is dirty.

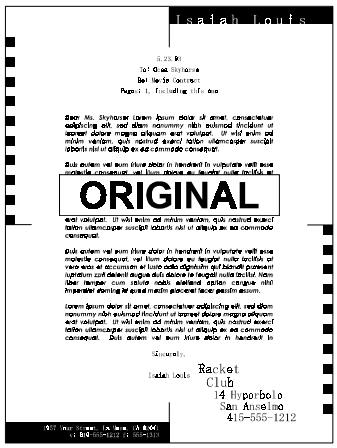
Action:

1. Try replacing the drum.
2. Check if the hot roller surface is dirty or not.
   - If it is, clean the roller or replace the cleaning pad.
   - If not, go to step 3.
3. Check if all the charge bias terminals on the development unit and the CTM, and the charge wire are properly connected or not.
   - If they are, check or replace the power pack.
   - If not, fix the connections.

6.1.4. Uneven Image Density



h521t608.wmf



h521t612.wmf

Possible Cause (Scanner)

- Dirty exposure glass

Action

- Clean the exposure glass (for both book and ADF).
- Replace the image sensor.

Possible Cause (Printer)

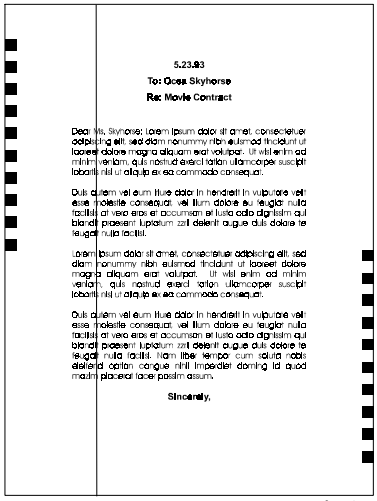
- Poor drum sensitivity.
- Dirty laser optic components.
- The toner metering blade is deformed, or incorrectly positioned.
- Uneven toner supply in the development toner hopper.
- Quenching lamp defect.

Action:

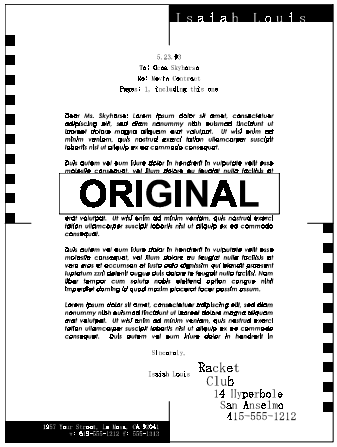
1. Print a solid black test pattern, and open the cover in the middle of printing.

2. Check if the toner is evenly distributed on the development roller.
   - If it is not, check the toner metering blade, and the toner supply mechanism in the toner hopper. If yes, go to step 3.
   - If the image is lighter in the center of the image, toner may be low. Replace the CTM and supply more toner.
3. Check if the toner is evenly distributed on the drum.
   - If it is not, check the drum sensitivity, the laser optic components, and the quenching lamp on the CTM.
   - If it is, check if there is any dirt on the transfer roller surface.

6.1.5. Vertical Black Lines



h521t603.wmf



h521t612.wmf

Possible Cause (Scanner)

When the problem occurs during book copying:

- Defective contact image sensor element(s).

When the problem occurs during ADF copying:

- Dirt or dust on the ADF exposure glass.
- Dirty white plate in the ADF.

Action:

1. Clean the exposure glass and the shading plate (for both book and ADF).
2. Replace the contact image sensor.

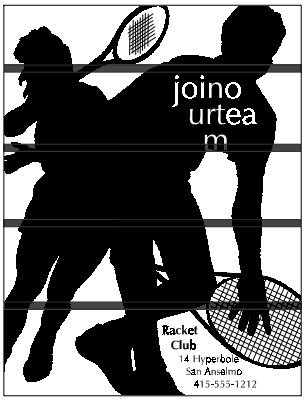
Possible Cause (Printer)

- Damaged cleaning blade.
- Dirty hot roller stripper(s).

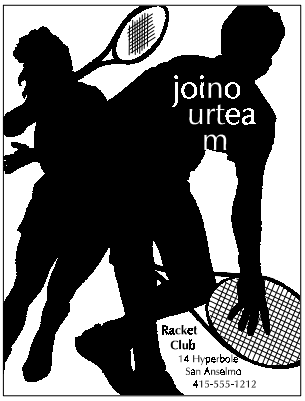
Action:

1. Replace the CTM.
2. Clean the hot roller strippers.

6.1.6. Horizontal Black Lines



h521t610.wmf



h521t611.wmf

Possible Cause (Printer)

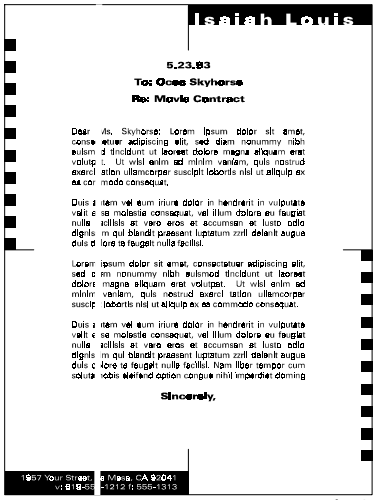
- The drum surface is scratched or damaged.
- Charge corona leak failure.

Action:

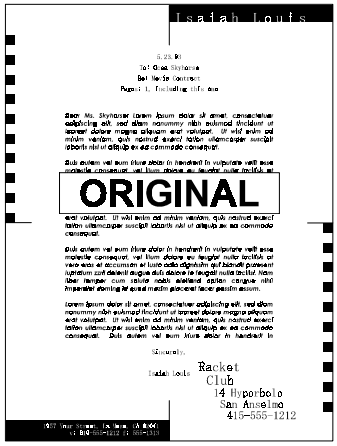
1. Check that the surface of the drum is not damaged.
   - Change the drum if it is damaged.

2. If the problem still remains, do the following.
   - Clean the charge wire.
   - Change the CTM.

6.1.7. Vertical White Lines



h521t606.wmf



h521t612.wmf

Possible Cause (Scanner)

- Defective image sensor element(s).

Action:

- Replace the image sensor.

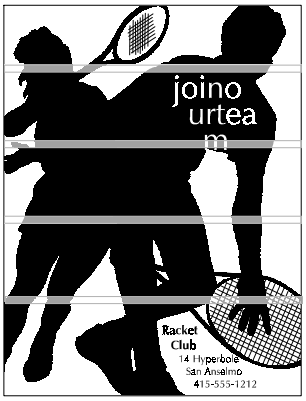
Possible Cause (Printer)

- The laser optic components are dirty.
- The hot roller stripper scrapes off toner from the print paper.

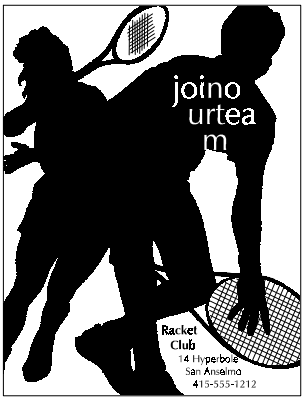
Action:

- Clean the laser optic components.
- Check the hot roller stripper mechanism. Clean the strippers and replace them if they are damaged.

6.1.8. Horizontal White Lines



h521t609.wmf



h521t611.wmf

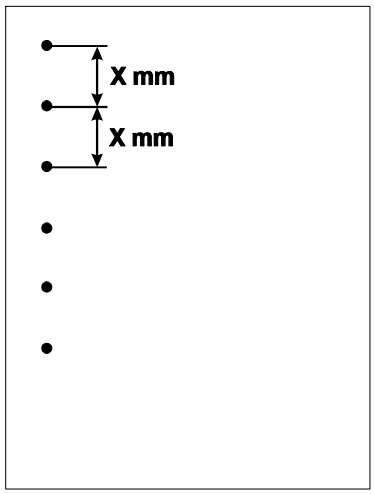
Possible Cause (Printer)

- The surface of the development roller is damaged or deformed.
- The development bias is not stable.
- Transfer current is not stable.

Action:

1. Print a test pattern, and open the cover in the middle of printing.
2. Check if horizontal white lines (where toner is not adhered) appear on the drum surface or not.
   - If they do, go to step 3.
   - If not, check the transfer roller surface and the transfer bias terminals connections. If they are OK, check or replace the power pack.
3. Check if horizontal white lines (where toner is not adhered) appear on the development roller surface or not.
   - If they do, check if the development roller surface is not deformed. If it is OK, check or replace the power pack.
   - If not, check for damage on the drum surface.

6.1.9. Black Dots/Spots



h521t602.wmf

Possible Cause (Scanner)

- Dust on the exposure glass.

Action:

- Clean the exposure glass.
- Try disabling MTF.

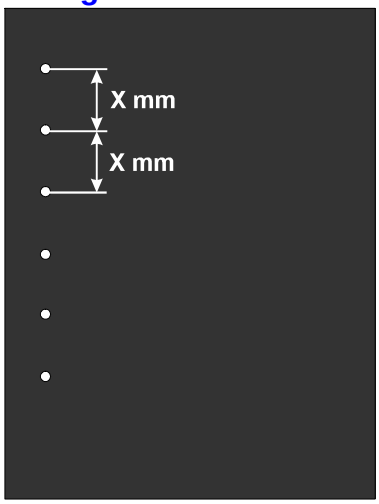
Possible Cause (Printer)

- The drum surface is damaged (this is likely if the dots appear at 94.2 mm intervals).

Action:

- Replace the drum.

6.1.10. White Spots in Black Image Areas



h521t601.wmf

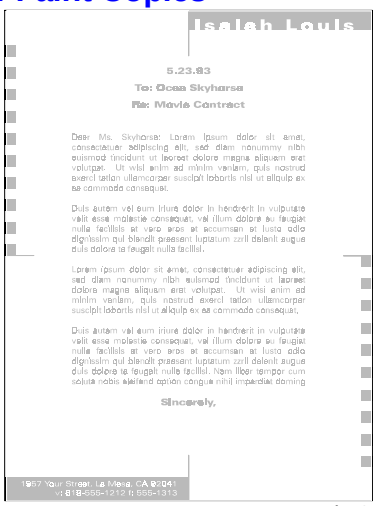
Possible Cause (Printer)

- The drum surface is damaged (this is likely if the dots appear at 94.2 mm intervals).
- The development roller surface is damaged (this is likely if the dots appear at 62.8 mm intervals).
- The toner application roller surface is damaged (this is likely if the dots appear at about 16.75 mm intervals).

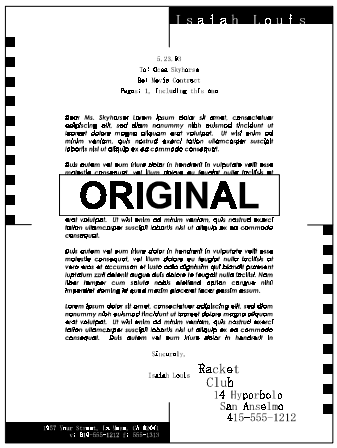
Action:

- Replace the drum.
- Clean the surface of the development roller and change the roller if it is damaged.
- Change the development unit.

6.1.11. Faint Copies



h521t604.wmf



h521t612.wmf

Possible Causes (Scanner)

- Dirty shading plate and/or exposure glass
- Wrong scan threshold
- Contact image sensor (xenon lamp, sensor element) defect

Action:

- Clean the white plate (for both book and ADF).
- Clean the exposure glass.
- Adjust the scan threshold settings.
- Replace the image sensor.

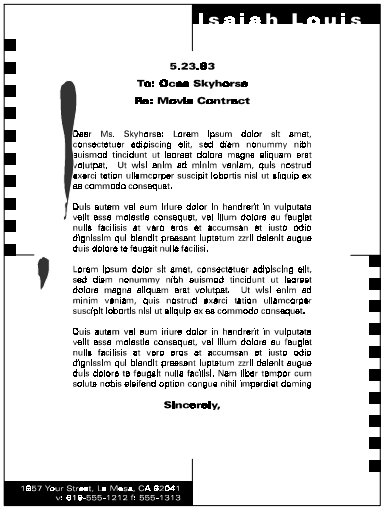
Possible Causes (Printer)

- Poor drum sensitivity.
- Dirty laser optic components.
- Incorrect development/ transfer bias
- Defective quenching lamp
- Low toner
- Low fusing temperature

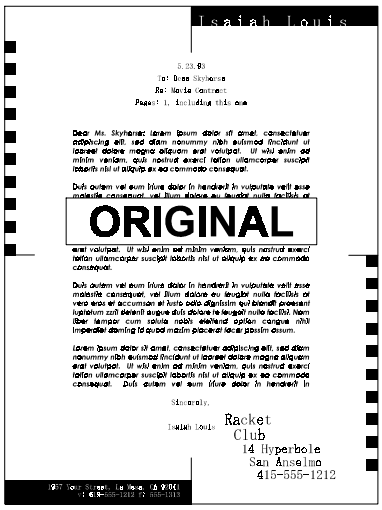
Action:

1. Check whether the toner saving feature has not been selected with the user parameters. (If it has been selected, there is no problem.)
2. Print a test pattern, and open the cover in the middle of printing.
3. Check if the toner on the paper at the entrance of the fusing unit looks faint or not.
   - If it does, check or replace the fusing lamp, thermistor, and PSU.
   - If it does not, go to step 4.
4. Check if the toner on the drum looks faint or not.
   - If it does, go to step 5.
   - If it does not, check the contacts between the transfer bias terminals and power pack.
5. Check if the toner on the development roller looks faint or not.
   - If it does, check all the contacts between the development and toner application rollers' bias terminals.
   - If it does not, try replacing the CTM and drum.

6.1.12. Vertical Black Band


Isaiah Louis
5.23.03
To: Ocea Skyhorse
Re: Movie Contract
Dear Ms. Skyhorse: Lorem ipsum dolor sit amet, consectetuer adipiscing elit, sed diam nonummy nibh euismod tincidunt ut laoreet dolore magna aliquam erat volutpat. Ut wisi enim ad minim veniam, quis nostrud exerci tation ullamcorper suscipit lobortis nisl ut aliquip ex ea commodo consequat.
Duis autem vel eum iriure dolor in hendrerit in vulputate velit esse molestie consequat, vel illum dolore eu feugiat nulla facilisis at vero eros et accumsan et iusto odio dignissim qui blandit praesent luptatum zzril delenit augue duis dolore te feugait nulla facilisi.
Lorem ipsum dolor sit amet, consectetuer adipiscing elit, sed diam nonummy nibh euismod tincidunt ut laoreet dolore magna aliquam erat volutpat. Ut wisi enim ad minim veniam, quis nostrud exerci tation ullamcorper suscipit lobortis nisl ut aliquip ex ea commodo consequat.
Duis autem vel eum iriure dolor in hendrerit in vulputate velit esse molestie consequat, vel illum dolore eu feugiat nulla facilisis at vero eros et accumsan et iusto odio dignissim qui blandit praesent luptatum zzril delenit augue duis dolore te feugait nulla facilisi. Nam liber tempor cum soluta nobis eleifend option congue nihil imperdiet doming
Sincerely,
1857 Your Street, La Mesa, CA 92041
vt 619-555-1212 fx 555-1313

h521t605



h521t612

Possible Cause (Printer)

- Dirty charge corona wire.
- The toner metering blade is deformed, damaged, or incorrectly positioned.

Action:

- Clean the charge corona wire. The wire cleaner is on the CTM.
- Replace the CTM.
- Check the toner metering blade and replace if it is damaged.

6.1.13. Unfused Copies

Possible Cause (Printer)

- The thermistor is defective.
- The fusing pressure roller spring mechanism is defective.
- The wrong type of toner is being used.
- A non-recommended type of paper is being used.

Action:

1. Check if the correct type of paper and toner are being used.
   - If it is, go to step 2.
   - If not, use recommended types of paper and toner.

2. Try replacing the fusing lamp and the roller.

6.1.14. Ghost Image

Possible Cause (Printer)

- Poor drum sensitivity.
- The cleaning blade is deformed or incorrectly positioned.
- Dirty hot roller

Action:

- Clean the cleaning blade.
- Replace the CTM.
- Clean the hot roller surface and/or replace the cleaning pad.
- Replace the drum.

6.1.15. Toner on the Back of the Printer Paper

Possible Cause (Printer)

- Dirty transfer roller
- Dirty fusing pressure roller

Action:

1. Check if the transfer roller is dirty with toner or not.
   - If it is, clean the roller surface.
     1) Take the roller off the machine.
     2) Gently tap the roller shaft to remove the toner.
     3) Turn the roller against a clean sheet of paper to let the toner transfer onto the paper.
   - If not, go to step 2.

2. Check if the fusing pressure roller is dirty with toner or not.
   - If it is, clean the fusing pressure roller.
   - If not, check for any other dirty rollers and clean them.

6.1.16. Misaligned Output (Data shifted to the right or left)

Possible Cause (Scanner)
- Incorrect setting of the document guide.

Action:
- Align each side of the document to the document guides.

Possible Cause (Printer)
- The laser optics are misaligned.
- Improper print margin setting (main scan direction).

Action:
- Adjust the main scan print margin. (Refer to Section 5-12.)
- Check that the laser optics are aligned correctly.

6.1.17. Misaligned Output (Image shifted vertically)/Reduced Image

Possible Cause:
- Improper print margin (sub scan direction).
- Dirty registration roller.

Action:
- Adjust the sub scan print margin. (Refer to Section 5-12.)
- Clean the registration roller.

6.2. MECHANICAL PROBLEMS

6.2.1. ADF

1. Non Feed

Possible Cause:

- An incorrect type or size of document is used.
- The ADF roller assembly is not properly installed.
- The pick-up and feed rollers are dirty or worn out.
- The mechanical clutch mechanism for document pick-up is defective.
- The ADF motor is defective.
- The platen cover sensor is defective.

Action:

1. Check that a correct type of document is being used.
2. Check that the ADF roller assembly is properly installed. Replace the assembly if it is damaged.
3. If the problem still remains, do the following.
   - Clean the pick-up and feed rollers with a soft cloth and water, and replace them if they are damaged.
   - Check the spring mechanism of the pick-up roller and replace it if it is damaged.
   - Check the connection between the FDU (CN62) and the ADF motor.
   - Check that the platen cover sensor is working properly and replace if it is damaged.
   - Replace the ADF motor.

2. Jam

Possible Cause:

- An incorrect type or size of document is used.
- The document is too long.
- The ADF rollers (pick-up, feed, R0, R1, and R2 rollers) are dirty.
- Obstruction in the document paper path.
- The scan line sensor is defective.
- Defective ADF motor

Action:

1. Check that a correct type of document is being used, and that the document length is within the maximum setting.
2. Check for obstructions in the paper path.
3. If the problem still remains, do the following.
   - Clean the rollers with a soft cloth and water, and replace them if they are damaged.
   - Check that the scan line sensor is working correctly.
   - Replace the ADF motor.

3. Skew

Possible Cause:

- An incorrect type or size of document is used.
- The document guide is not properly set.
- The ADF cover is not properly closed.
- The ADF roller assembly is not properly installed.
- The scanner rollers (pick-up, feed, R0, R1, and R2 rollers) are dirty.
- Obstruction in the document paper path.

Action:

1. Check that a correct type of document is being used.
2. Check that the ADF cover is securely closed and check that the document guide is properly set. Also, check that the ADF roller assembly is properly installed.
3. Check for obstructions in the paper path.
4. If the problem still remains, do the following.

Clean the rollers with a soft cloth and water, and replace them if they are damaged.

4. Multi-feed

Possible Cause:

- An incorrect type or size of document is used.
- The separation roller is worn or dirty.

Action:

- Clean or replace the separation roller.
- Check that the spring under the separation roller is properly installed.

6.2.2. Book Scanner

1. Abnormal Noise

Possible Cause:

- Obstruction in the scanner drive path.
- Malfunction in the scanner drive components.

Action:

- Do the scanner test (service function 10) and check that the scanner moves correctly. If not, check that the scanner drive components are working properly, and also check for obstructions in the scanner drive path.
- If there is noise coming from the guide shaft, lubricate all surfaces of the shaft with Launa oil (refer to section 5.2.1 for details).

2. Scanner Home Position Error (Error Code 9-11)

Possible Cause:

- The scanner drive wire is out of position.
- The scanner drive wire is damaged or broken.
- Malfunction in the scanner drive components.
- Obstruction in the scanner drive path.
- The red clip which secures the scanner has not been removed. (This clip should be removed at installation.)

Action:

- Check that the scanner drive components are in the correct position.
- Check that the scanner drive wire is positioned correctly.
- Check for obstructions in the scanner drive path.
- Check that the spring which secures the drive wire to the scanner is working properly and replace if it is damaged.
- Check that the red clip which secures the scanner has been removed. (Refer to the Appendix A of the Opertaor’s Manual for details.)

3. Automatic Paper Selection Error

Possible Cause:

- Defective book original size sensor(s).
- Improper bit switch setting for original size detection.

Action:

- Check that the book original size sensors are working properly and replace any defective sensor.
- Check that settings of system switch 0D match the paper sizes being used.

4. Scanning Start Position Error (Error Code 1-09)

Cause:

- The shading plate is dirty.
- The image sensor element is defective.

Action:

- Clean the shading plate, especially around the black mark (for both book and ADF).
- Replace the image sensor.

6.2.3. Printer

1. Non-feed

Possible Cause:

- A non-recommended type of paper is being used.
- The paper cassette end fence is not properly set.
- The paper lift mechaninsm (slide lock) is not working properly.
- Malfunction in the paper feed clutch.
- The paper feed roller(s) is not properly set.
- The paper feed motor is defective.
- The registration sensor is defective.

Action:

1. Check that a correct type of paper is being used.
2. Check that the paper cassette end fence is correctly set and check the paper lift mechanism (slide lock and the springs).
3. Check that the feed clutch for the cassette that was used is working properly.
4. Check that the paper feed roller(s) is properly installed. Clean or replace if necessary.
5. Check the registration roller and its mechanism. Clean or replace if necessary.
6. Check that the registration sensor is correctly working.
7. If the problem still remains, do the following.
   - Check the connections between the FDU (CN63) and the paper feed motor.
   - Replace the paper feed motor.

2. Paper Jam - Inside the Printer

Possible Cause:

- A non-recommended type of paper is being used.
- The paper end fence and/or the paper guides in the cassette is not properly set.
- The registraton roller is dirty.
- The registration sensor is defective.
- Obstruction in the paper path.
- The main motor is defective.

Action:

1. Check if a correct type of paper is being used, and check that the paper end fence and the paper guides are correctly set.
2. Check for obstructions in the paper path.
3. Check the registration roller and its mechanism. Clean or replace if necessary.
4. Check that the registration sensor is working properly.
5. If the problem still remains, do the following.
   - Check the connections between the FDU (CN15) and the main motor.
   - Replace the main motor.
   - Check the FDU output of power and drive signals to the main motor (CN15-1, 3). If signals are not output, replace the FDU or FCE.
   - Check the fusing unit drive mechanism. Check that all the gears are properly installed.

3. Jam - Fusing Exit

Possible Cause:

- A non-recommended type of paper is being used.
- Obstruction in the paper path.
- The registration sensor is defective.
- Malfunction in the fusing drive mechanism.
- The paper feed out sensor is defective.
- Malfunction in the hot roller stripper(s) mechanism.
- Malfunction in the pressure mechanism in the fusing unit.

Action:

1. Check if a correct type of paper is being used.
2. Check for obstructions in the paper path.
3. Check that the registration sensor is working correctly.
4. Check all the gears in the fusing drive mechanism.
5. Check that the paper feed out sensor is working correctly.
6. Check the hot roller strippers and the pressure mechanism in the fusing unit.

4. Skew

Possible Cause:

- A non-recommended type of paper is being used.
- Incorrect positioning of the paper guides in the paper cassette.
- The corner separators are out of position.
- The paper feed rollers are worn out or damaged.
- Obstruction in the paper path.
- Malfunction in the registration mechanism.

Action:

1. Check if a correct type of paper is being used.
2. Check that the paper guides and the corner separators in the paper cassette are correctly set.
3. Check that the paper feed rollers are correctly installed and clean or replace them if necessary.
4. Check for obstructions in the paper path.
5. Check the registration mechanism and clean or replace the rollers if necessary.

5. Multi-feed

Possible Cause:

- A non-recommended type of paper is being used.
- Incorrect positioning of the paper guides and/or end fence in the paper cassette.

Action:

- Check if a correct type of paper is being used.
- Check that the paper guides and the end fence are correctly set.

6.3. SERVICE CALL CONDITIONS

If the Call Service indicator is lit, one of the following conditions has occurred.

Symptom	Error Code	Sub-code	SC-code
Scanner home position error	9-11	71	7-71
Charge leak current detected while the charge corona unit was activated.	9-17	11	1-11
Charge leak current detected while the charge corona unit was not activated.	9-17	12	1-12
Laser diode failure	9-20	21	2-21
Fusing unit failure (fusing lamp at high temperature during printing)	9-22	01	0-01
Fusing unit failure (fusing lamp not at printing temperature after warm-up)	9-22	02	0-02
Fusing unit failure (fusing lamp at high temperature in power saver mode)	9-22	03	0-03
Fusing unit failure (fusing lamp at high temperature in power saver mode)	9-22	04	0-04
Fusing unit failure (fusing lamp at low temperature in power saver mode)	9-22	05	0-05
Fusing unit failure (fusing lamp at low temperature during printing)	9-22	07	0-07
Fusing unit failure (fusing lamp at an extremely high temperature)	9-22	08	0-08
Fusing unit failure (thermistor error)	9-22	09	0-09
Hexagonal mirror motor startup error	9-23	31	3-31
Hexagonal mirror motor error while printing	9-23	32	3-32
Main motor startup error	9-24	41	4-41
Main motor error while printing	9-24	42	4-42

To find out which problem has occurred, either:

- See the Auto Service Call report that was sent to the service station by the machine. This report lists a sub-code, as well as the error message; this sub-code may help you find the problem.
  Or, check the sub-code stored at RAM addresses 80033C(H) and 8003B5(H).
- Check the error code history using service function 03.
- Try to clear the service call condition (for failures which are not related to the fusing unit): switch the power off, wait 10 seconds, then switch back on.
- An SC-code is displayed on the LCD panel when the error occurs.

If the problem remains, work through the appropriate troubleshooting procedure from the following pages.

After each troubleshooting attempt, reset the machine and try to operate it. If the machine still does not work, continue troubleshooting.

Symptom: Scanner Home Position Error (Error Code 9-11)

This error occurs in either of the following conditions:

- If FDU CN61-5 stays low after the motor has moved 480 mm back to the home position after scanning
- If FDU CN61-5 stays high after the motor has moved 20 mm from the home position at the start of scanning
- If FDU CN61-5 stays low at power on

Check	Action if Yes	Action if No
1. Is the scanner at the home position when the error occurs ?	Remove the scanner securing clip if it is still installed. Otherwise, check the sensor output at CN61-5. Then go to step 2.	Turn off the machine and turn it back on with the platen cover open. Then go to step 3.
2. Is the sensor output low ?	Replace the sensor.	Replace the FDU or FCE.
3. Does the same error happen ?	Open the scanner and check where the scanner is when the error happened.	Try to run the scanner several times. If the problem remains, go back to step 3.
4. Is there any blockage between the sensor's photoemitter and receiver ?	Clean the sensor.	Go to step 5.
5. Is there any blockage in the scanner mechanism ?	Clean the scanner or remove the blockage.	Go to step 6.
6. Push down the contact image sensor until it stops. Is the vertical stroke more than 2 mm ?	Check the scanner drive mechanism, and fix it if any problem is found.	Take out the image sensor and adjust the position of the sensor harness or ground wire under the image sensor.

Symptom: Charger Leak (Error Code 9-17)

This error occurs in either of the following conditions:

- If FDU CN21-8 stays low for 3 s or more while the charge corona is on (sub-code 11)
- If FDU CN21-8 stays low for 3 s or more while the charge corona is off (sub-code 12)

Check	Action if Yes	Action if No
1. Clean the charge corona wire and unit. Check the if the charge wire is cut off and replace the CTM if it is broken.		
2. If the sub-code is 11, do the following. If the sub-code is 12, go to step 5.		
3. Are all of the charge bias terminals connected ?	Go to step 4.	Secure the connections and/or replace the CTM or development unit.
4. Replace the power pack. Does the problem still remain?	Replace the FDU or FCE.	
5. If the sub-code is 12, do the following.		

Symptom: Charger Leak (Error Code 9-17)		
6. Does CN21-3 stay low while in standby mode ?	Replace the FDU or FCE.	Go to step 7.
7. Does CN21-8 stay low while in standby mode ?	Replace the power pack.	

Symptom: LD Failure (Error Code 9-20)

This error occurs in the following condition:

- The laser synchronization signal was not detected within 10 ms of the start of printing (sub-code 21)

Check	Action if Yes	Action if No
Check that all the laser optic components are aligned correctly and clean them if necessary. Check that the optical fibre is properly set. Check the connection between the FDU (CN26) and the LDDR. Check that the polygonal mirror motor and LDDR are correctly positioned. If the problem still remains, replace the LDDR, FDU or FCE.		

Symptom: Fusing Unit Failure (Error Code 9-22)

This error occurs in any of the following conditions:

- During printing: If the fusing lamp stays above 185 °C for more than 60 s (sub-code 01)
- Before start printing: If the fusing lamp takes more than 40 s to reach 160 °C (sub-code 02)
- Power saver mode (fusing lamp OFF selected): If the fusing lamp takes more than 20 minutes to fall back to 100 °C. (sub-code 03)
- Power saver mode (fusing lamp Power Saver Standby selected): If the fusing lamp takes more than 20 minutes to fall back to 100 °C. (sub-code 04)
  Power saver mode (fusing lamp Standby selected): If the fusing lamp takes more than 5 minutes to fall back to 145 °C. (sub-code 04)
- Power saver mode (fusing lamp Power Saver Standby selected): If the fusing lamp stays below 80 °C for more than 18 s. (sub-code 05)
  Power saver mode (fusing lamp Standby selected): If the fusing lamp stays below 145 °C for more than 25 s. (sub-code 05)
- During printing: If the fusing lamp stays below 140 °C for more than 1 s (sub-code 07)
- At any time: If the fusing lamp temperature reaches 250 °C (sub-code 08)
- At power on: If a thermistor defect (disconnection) is detected (sub-code 09)

Check	Action if Yes	Action if No
Before checking anything, do the following. Reset the RAM address 80033C(H) to 00(H), then switch the power off, wait for a few seconds, then switch back on. If the problem remains, check the following points.		

Sub-code 01, 03, 04:

1. Replace the fusing lamp, thermistor, PSU, FDU and/or FCE.

Sub-code 02, 05, 07:

1. Check if the fusing lamp, thermostat, and/or the thermofuse is(are) open or not.
   - If yes, replace the defective component(s).
   - If no, go to step 2.

Symptom: Fusing Unit Failure (Error Code 9-22)
2. Check if ac power is supplied to the lamp from the PSU or not. - If yes, go to step 3. - If no, replace the PSU.
3. Check if FDU CN12-1 and/or FDU CN12-2 stays low during printing. - If yes, replace the PSU, FDU, or FCE. - If no, check the connection from the PSU to the lamp.
Sub-code 08:
1. Check for any defects in the machine, and replace the defective parts. If any damage could not be found, go to step 2.
2. Check if the thermistor is shorted or not. - If yes, replace the thermistor. - If no, try replacing the FDU and/or FCE
Sub-code 09:
1. Check the connection between the FDU (CN25) and the thermistor.

Symptom: Polygonal Mirror Motor Failure (Error Code 9-23)

This error occurs in either of the following conditions:

- If FDU CN14-4 does not go low within 10 s of the polygonal mirror motor being switched on (sub-code 31)
- If FDU CN14-4 goes back to high for 3 s or more during polygonal mirror motor operation (sub-code 32)

Check	Action if Yes	Action if No
1. Check the connection between the FDU (CN14) and the polygonal mirror motor.		
2. Check that +24VM from the FDU (CN14-1) is supplied to the polygonal mirror motor.	Replace the polygonal mirror motor.	Replace the FDU. If the problem still remains, replace the FCE.

Symptom: Main Motor Failure (Error Code 9-24)

This error occurs in either of the following conditions:

- If FDU CN15-4 does not go low within 10 s of the main motor being switched on (sub-code 41)
- If FDU CN15-4 goes back to high for 3 s or more during main motor operation (sub-code 42)

Check	Action if Yes	Action if No
1. Check that the main motor drive mechanism is not obstructed. 2. Check that all the main motor drive gears are correctly installed.		
3. Replace the main motor. Does the problem still remain?	Replace the FDU. If the problem still occurs, replace the FCE.	

6.4. ERROR CODES

If an error code occurs, retry the communication. If the same problem occurs, try to fix the problem as suggested below. Note that error codes 4-00, 01, 02, and 10 only appear in the error code display and on the service report.

Code	Meaning	Suggested Cause/Action
0-00	DIS/NSF not detected within 40 s of Start being pressed	Check the line connection. Check the NCU - FDU connectors. The machine at the other end may be incompatible. Replace the NCU or FCE. Check for DIS/NSF with an oscilloscope. If the rx signal is weak, there may be a bad line.
0-01	DCN received unexpectedly	The other party is out of paper or has a jammed printer. The other party pressed Stop during communication.
0-03	Incompatible modem at the other end	The other terminal is incompatible.
0-04	CFR or FTT not received after modem training	Check the line connection. Check the NCU - FDU connectors. Try changing the tx level and/or cable equalizer settings. Replace the FCE or NCU. The other terminal may be faulty; try sending to another machine. If the rx signal is weak or defective, there may be a bad line. **Cross reference** Tx level - NCU Parameter 01 (PSTN), RAM 807FB7 (PABX) Cable equalizer - G3 Switch 07 (PSTN), G3 Switch 08 (PABX) Dedicated Tx parameters - Section 4-4
0-05	Unsuccessful after modem training at 2400 bps	Check the line connection. Check the NCU - FDU connectors. Try adjusting the tx level and/or cable equalizer. Replace the FCE or NCU. Check for line problems. **Cross reference** See error code 0-04.
0-06	The other terminal did not reply to DCS	Check the line connection. Check the FDU - NCU connectors. Try adjusting the tx level and/or cable equalizer settings. Replace the NCU or FCE. The other end may be defective or incompatible; try sending to another machine. Check for line problems. **Cross reference** See error code 0-04.

Code	Meaning	Suggested Cause/Action
0-07	No post-message response from the other end after a page was sent	Check the line connection. Check the FDU - NCU connectors. Replace the NCU or FCE. The other end may have jammed or run out of paper. The other end user may have disconnected the call. Check for a bad line. The other end may be defective; try sending to another machine.
0-08	The other end sent RTN or PIN after receiving a page, because there were too many errors	Check the line connection. Check the FDU - NCU connectors. Replace the NCU or FCE. The other end may have jammed, or run out of paper or memory space. Try adjusting the tx level and/or cable equalizer settings. The other end may have a defective modem/NCU/FDU; try sending to another machine. Check for line problems and noise. **Cross reference** Tx level - NCU Parameter 01 (PSTN), RAM 807FB7 (PABX) Cable equalizer - G3 Switch 07 (PSTN), G3 Switch 08 (PABX) Dedicated Tx parameters - Section 4-4
0-14	Non-standard post message response code received	Check the FDU - NCU connectors. Incompatible or defective remote terminal; try sending to another machine. Noisy line: resend. Try adjusting the tx level and/or cable equalizer settings. Replace the NCU or FCE. **Cross reference** See error code 0-08.
0-15	The other end does not have the confidential or transfer function	The other terminal does not have the confidential rx or transfer function, or the other terminal's memory is full.
0-16	CFR or FTT not detected after modem training in confidential or transfer mode	Check the line connection. Check the FDU - NCU connectors. Replace the NCU or FCE. Try adjusting the tx level and/or cable equalizer settings. The other end may have disconnected, or it may be defective; try calling another machine. If the rx signal level is too low, there may be a line problem. **Cross reference** See error code 0-08.
0-17	Communication was interrupted by pressing the Stop key.	If the Stop key was not pressed and this error keeps occurring, replace the operation panel or OPU.

Code	Meaning	Suggested Cause/Action
0-20	Facsimile data not received within 6 s of retraining	Check the line connection. Check the FDU - NCU connectors. Replace the NCU or FCE. Check for line problems. Try calling another fax machine. Try adjusting the reconstruction time for the first line and/or rx cable equalizer setting. **Cross reference** Reconstruction time - G3 Switch 0A, bit 6 Rx cable equalizer - G3 Switch 07 (PSTN), G3 Switch 08 (PABX)
0-21	EOL signal (end-of-line) from the other end not received within 5 s of the previous EOL signal	Check the connections between the FDU, NCU, & line. Check for line noise or other line problems. Replace the NCU or FCE. The remote machine may be defective or may have disconnected. **Cross reference** Maximum interval between EOLs and ECM frames - G3 Bit Switch 0A, bit 4
0-22	The signal from the other end was interrupted for more than the acceptable modem carrier drop time (default: 0.2 s)	Check the line connection. Check the FDU - NCU connectors. Replace the NCU or FCE. Defective remote terminal. Check for line noise or other line problems. Try adjusting the acceptable modem carrier drop time. **Cross reference** Acceptable modem carrier drop time - G3 Switch 0A, bits 0 and 1
0-23	Too many errors during reception	Check the line connection. Check the FDU - NCU connectors. Replace the NCU, FDU or FCE. Defective remote terminal. Check for line noise or other line problems. Try asking the other end to adjust their tx level. Try adjusting the rx cable equalizer setting and/or rx error criteria. **Cross reference** Rx cable equalizer - G3 Switch 07 (PSTN), G3 Switch 08 (PABX) Rx error criteria - Communication Switch 02, bits 0 and 1
0-24	Printer failure occurred while the memory was full during non-ECM reception; negative response returned	There is no memory space available, or substitute reception is disabled. Try changing the post-message command tx timing. Try asking the user to add optional extra memory. **Cross reference** Post-message command tx timing -

Code	Meaning	Suggested Cause/Action
0-30	The other terminal did not reply to NSS(A) in AI short protocol mode	Check the line connection. Check the FDU - NCU connectors. Try adjusting the tx level and/or cable equalizer settings. The other terminal may not be compatible. **Cross reference** Dedicated tx parameters - Section 4-4
0-52	Polarity changed during communication	Check the line connection. Retry communication.
1-00	Document jam	Incorrectly inserted document or unsuitable document type. Check the ADF drive components and sensors. **Cross reference** ADF mechanical problems - Section 6-2-1
1-01	Document length exceeded the maximum	Try changing the maximum acceptable document length. Divide the document into smaller pieces. Check the ADF drive components and sensors. **Cross reference** Max. document length - Scanner switch 00, bits 2 and 3 ADF mechanical problems - Section 6-2-1
1-09	Scanning start position mark not detected (scanning continues as normal)	Clean the start position mark (square black mark) and the area surrounding it. Replace the image sensor. **Cross reference** Book scanner mechanical problem - Section 6-2-2
1-10	Paper at the scan line when the power was turned on.	Remove the paper. Check the scan line sensor. **Cross reference** ADF mechanical problems - Section 6-2-1
1-17	Document jam in the feed-out area	Clear any debris from the sensor actuator. Check the ADF drive components and sensors. **Cross reference** ADF mechanical problems - Section 6-2-1
1-20	Paper did not reach the fusing exit at the end of printing	Remove the paper. Check the printer drive components and sensors. **Cross reference** Printer mechanical problems - Section 6-2-2
1-21	Paper present at the fusing exit after printing	Remove the paper. Check the printer drive components and sensors. **Cross reference** Printer mechanical problems - Section 6-2-2
1-30	Paper ran out during printing	Add paper in the cassette.
1-34	Paper ran out after printing	Add paper in the cassette.
1-71	The cover was opened or the cassette was pulled out during printing	Close the cover or put back the cassette.

Code	Meaning	Suggested Cause/Action
2-10	The modem cannot enter tx mode	Replace the FCE.
2-11	Only one V.21 connection flag was received	Change the FCE.
2-12	Modem clock irregularity	Replace the FCE.
2-20	Abnormal coding/decoding (cpu not ready)	Replace the FCE.
2-50	The machine reset itself	Replace the FCE.
4-00	One page took longer than 8 minutes to transmit	Check for a bad line. Try the communication at a lower resolution, or without halftone. Change the FCE.
4-01	Line current was cut	Check the line connector. Check the connection between FDU and NCU. Check for line problems. Replace the FDU or the NCU.
4-02	The other end cut the received page as it was longer than the maximum limit.	Split the page into smaller pieces, or ask the other end to change their maximum receive length setting, then resend.
4-10	Communication failed because of ID Code mismatch (Closed Network) or Tel. No./CSI mismatch (Protection against Wrong Connections)	Get the ID Codes the same and/or the CSIs programmed correctly, then resend. The machine at the other end may be defective.
5-00	Data reconstruction not possible	Replace the FCE.
5-10	DCR timer expired	Replace the FCE.
5-20	Storage impossible because of a lack of memory	Temporary memory shortage. Test the SAF memory. Replace the FCE or optional IC card.
5-21	Memory overflow	
5-22	Mode table overflow after the second page of a scanned document	Wait for the messages which are currently in the memory to be sent or delete some files from memory.
5-23	Print data error when printing a substitute rx or confidential rx message	Test the SAF memory. Ask the other end to resend the message. Replace the FCE or IC memory card.
5-24	Memory overflow after the second page of a scanned document	Try using a lower resolution setting. Wait for the messages which are currently in the memory to be sent or delete some files from memory.
5-25	SAF file access error	Replace the FCE or IC memory card.
5-30	Mode table for the first page to be printed was not effective	Replace the FCE or IC memory card.

Code	Meaning	Suggested Cause/Action
6-01	G3 ECM - no V.21 signal was received	Try adjusting the rx cable equalizer. Replace the FCE, FDU or NCU.
6-02	G3 ECM - EOR was received	
6-03	G3 ECM - non-standard V.21 code received	The other terminal may be defective.
6-04	G3 ECM - RTC not detected	Check the line connection. Check connections from the NCU to the FDU. Check for a bad line or defective remote terminal. Replace the FCE, FDU or NCU.
6-05	G3 ECM - facsimile data frame not received within 18 s of CFR, but there was no line fail	Check the line connection. Check connections from the NCU to the FDU. Check for a bad line or defective remote terminal. Replace the FCE, FDU or NCU. Try adjusting the rx cable equalizer **Cross reference** Rx cable equalizer - G3 Switch 07 (PSTN), G3 Switch 08 (PABX)
6-06	G3 ECM - coding/decoding error	Defective FDU. The other terminal may be defective.
6-08	G3 ECM - PIP/PIN received in reply to PPS.NULL	The other end pressed Stop during communication. The other terminal may be defective.
6-09	G3 ECM - ERR received	Check for a noisy line. Adjust the tx levels of the communicating machines. See code 6-05.
6-10	G3 ECM - error frames still received at the other end after all communication attempts at 2400 bps	Check for line noise. Adjust the tx level (use NCU parameter 01 or the dedicated tx parameter for that address). Check the line connection. Defective remote terminal.
6-11	G3 ECM - printing impossible because of a missing first line in the MMR coding	Check for problems in the printer mechanism.
6-21	V.21 flag detected during high speed modem communication	The other terminal may be defective or incompatible.
6-39	V.21 signal not stopped within 6 s	Replace the FCE.
9-07	Paper non-feed or jam at the cassette entrance	If the problem persists, replace the FDU. **Cross reference** Paper non-feed - Section 6-2-2 Jam at the cassette entrance - Section 6-2-2
9-08	Paper jam inside the development area	If the problem persists, replace the FDU. **Cross reference** Paper jam - Section 6-2-2
9-09	Paper jam in the fusing exit area	If the problem persists, replace the FDU. **Cross reference** Paper jam - Section 6-2-2

Code	Meaning	Suggested Cause/Action
9-10	Toner end detected	Replace the CTM.
9-11	Home position not detected in book scanner mode	If the problem persists, replace the FCE. **Cross reference** Charge corona failure - Section 6-3
9-12	Cover open detected during printing	Close the cover, or check the cover sensors.
9-17	Charge corona unit failure	If the problem persists, replace the FCE. **Cross reference** Charge corona failure - Section 6-3
9-20	Laser diode failure	If the problem persists, replace the FCE. **Cross reference** LD failure - Section 6-3
9-22	Fusing lamp failure	If the problem persists, replace the FCE. **Cross reference** Fusing lamp failure - Section 6-3
9-23	Hexagonal mirror motor failure	If the problem persists, replace the FCE. **Cross reference** Mirror motor failure - Section 6-3
9-24	Main motor failure	If the problem persists, replace the FCE. **Cross reference** Main motor failure - Section 6-3
9-80	Bypass feed - paper non-feed or jam at the entrance	Check the registration roller and sensor. **Cross reference** Printer mechanical problems - Section 6-2-2
9-81	Bypass feed - paper length exceeds the maximum limit (600 mm)	Check the paper feed mechanism and sensors. **Cross reference** Printer mechanical problems - Section 6-2-2
9-82	Optional 100 sheet cassette - paper non-feed or jam at the cassette entrance	Check the paper feed mechanism and sensors. **Cross reference** Printer mechanical problems - Section 6-2-2
9-83	Optional 100 sheet cassette - paper length exceeds the maximum limit (600 mm)	Check the paper feed mechanism and sensors. **Cross reference** Printer mechanical problems - Section 6-2-2

6.5. ELECTRICAL COMPONENT DEFECTS

6.5.1. Defective Sensor Table

Sensor	Status	Symptoms if Defective
ADF document sensor	ON	"CLEAR ORIGINAL" or "DIAL FAX NO" is displayed at power-up.
	OFF	"SET DOCUMENT" is still displayed after a document is placed in the feeder.
ADF scan line sensor	ON	"CLEAR ORIGINAL" is displayed at power-up.
	OFF	"CLEAR ORIGINAL" is displayed soon after the start of copying.
ADF document width sensor	ON	"CLEAR ORIGINAL" is displayed at power-up.
	OFF	Only A4/Letter width can be scanned.
ADF cover switch	ON	No error message appears if the cover is opened.
	OFF	“CLOSE COVER” is displayed at power on.
ADF release switch	ON	No error message is displayed if the cover is opened.
	OFF	“CLOSE COVER” is displayed at power on.
Book scanner home position sensor	ON	SC code 7-71 is displayed soon after starting a copy operation. (Error code 9-11)
	OFF	SC code 7-71 is displayed soon after power on. (Error code 9-11)
Platen cover sensor	ON (Open)	ADF does not work.
	OFF (Close)	The Automatic Paper Select function does not work correctly. The original size is not reset even if an original of a different size is placed under the platen cover.
Book original size sensors	---	The Automatic Paper Select does not work correctly.
Interlock switches	ON	There is no alarm on opening the cover, and "CLOSE COVER" is not displayed.
	OFF	"CLOSE COVER" is displayed at power-up.
Registration sensor Fusing exit sensor	ON	"CLEAR COPY" is displayed at power-up.
	OFF	"CLEAR COPY" is displayed after the start of copying.
Bypass feed sensor	ON	"CLEAR COPY" is displayed after the automatic reset timer expires.
	OFF	Bypass feed cannot be used.
Toner end sensor	ON	“ADD TONER” is displayed.
	OFF	Toner end is not indicated.
Paper size sensor - Standard cassette	---	"ADD PAPER" or the wrong paper size is displayed at power-up.
	---	Page separation may be done even if the original is the same size as the copy paper.

Sensor	Status	Symptoms if Defective
Paper end sensor - Standard cassette	ON	The Add Paper indicator lights even if paper is remaining.
	OFF	The Add Paper indicator does not light when the paper has run out.
Paper size sensor - 100 sheet cassette	---	"ADD PAPER" or the wrong size is displayed at power-up.
	---	Page separation may be done even if the original is the same size as the copy paper.
Paper end sensor - 100 sheet cassette	ON	The Add Paper indicator on the lower cassette's operation panel lights even if paper is remaining.
	OFF	The Add Paper indicator on the lower cassette's operation panel does not light when the paper has run out.
Thermistor	Open	SC code 0*09 is displayed at power on. (Error code 9-22)
	Short	SC code 0*08 is displayed at power on. (Error code 9-22)
Thermostat	Open	SC code 0*xx is displayed at power on or at the start of printing depending on the fusing standby temperature setting.

6.5.2. Blown Fuse Table

The only service-replaceable fuses are the following.

Fuse	Symptoms if Defective
PSU - F1/ F2/F3	No power to the machine. (F3 - 220V PSU only)
Thermofuse (Not installed in the US model.)	Fusing power is not supplied.

Point-to-Point Diagram
Model: LSO (MV310)

Issued on: May 22nd, 1995
Revision 1.0
Subject to change